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Preface

Africa and the Middle East is one of six reports in the International Agriculture and Trade Report series. The 1994 report focuses on the agricultural situation, policy changes, and economic outlook for Sub-Saharan countries. The 1993 issue

of *Africa and the Middle East* reviewed the agricultural situation and trade outlook for North Africa and the Middle Eastern countries.

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Summary

Sub-Saharan Africa is caught in a web of interlocking problems. Finding solutions amid continuing crises is the challenge facing policymakers. Agricultural growth lags behind population growth, widening food gaps and stifling income growth. Commercial food imports to fill food gaps drain limited foreign exchange reserves, thus diverting funds from productive domestic investment. The countries remain unsuccessful in adopting new technologies to raise food crop yields or to lessen the high variability in agricultural production. To these factors are added unfavorable terms of trade facing African countries, and the civil strife and political instability that have become more widespread in the post cold war period.

Most countries depend on imports of food, energy, and capital inputs to complement domestic production. After peaking at more than \$70 billion in 1981, total imports dropped every year in the early and mid-1980's, but climbed gradually in the late 1980's and early 1990's. In 1992, imports remained almost 30 percent below 1981's peak. Lower imports are due to foreign exchange constraints resulting from reduced export earnings and net capital outflow. Other causes are structural adjustment policies, including currency devaluation, which have made imports more expensive than in the past.

The industrial countries are Sub-Saharan Africa's major trading partners. The United States, with agricultural exports to the region totaling more than \$1 billion in 1992, runs a small agricultural trade surplus with Sub-Saharan Africa while the European Union has a substantial deficit.

Food imports, consisting mainly of grains, accounted for approximately 10-15 percent of the total import value in Sub-Saharan Africa in the last two decades. Food heads the list of import priorities in most countries. Spending on food imports has crowded out spending on needed raw materials and spare parts, raising concerns over the region's economic health. However, the political risk of allowing food shortages generally weighs heavily with African governments.

Food imports are necessitated by slow growth in domestic production. Between 1980 and 1990, agricultural production in Sub-Saharan Africa grew roughly 2.5 percent per year. Given the region's population growth rate of 3.1 percent, agricultural output declined in per capita terms. To increase per capita food intake and modestly improve living standards at current rates of population increase, agricultural production needs to grow about 4 percent a year over the next 25 years.

Agricultural production growth in Sub-Saharan Africa has been constrained by government policies, disruptions due to civil strife, deteriorating infrastructure, shortages of inputs, and environmental problems. Because of agriculture's im-

portance in the economy, governments have intervened in production, consumption, and trade of products and inputs. Politically popular policies that favor urban consumers, such as subsidized prices or overvalued currencies, have often stifled agricultural production. Producer prices set by governments below world levels provided a disincentive to farmers. Exchange rate policies supporting overvalued currencies indirectly taxed farmers by reducing the value of products exported.

New technology, support services, and incentives to boost agricultural growth rates are simply not available. Production is projected to continue increasing 2.5 percent annually in the next decade, implying a continued decline on a per capita basis.

The proportion of Africa's population that is chronically undernourished has remained practically unchanged since the 1970's, but due to the high population growth rate the number of people affected has increased from 130 million to 180 million. By the end of the 1980's, high-income countries had more than 3,000 calories available per person per day, while Sub-Saharan Africa averaged around 2,000 calories.

Poverty is identified as the root cause of poor nutrition. The level and distribution of Sub-Saharan Africa's income are serious problem areas. In 1992, the region's average per capita income was \$350, or about 2 percent of that in the United States. Low and declining incomes are leaving large numbers of people nutritionally vulnerable.

The alternatives to significant growth in domestic agricultural output are greater dependence on food imports or further decreases in consumption. Most countries in the region lack the financial resources to fill the food gap with commercial imports. As a consequence, annual per capita consumption of grains declined from 134 kilograms to 122 kilograms between 1980 and 1993. Sub-Saharan Africa's grain imports jumped almost 30 percent to 11 million tons in 1993. Without foreign exchange, food aid is vital to Sub-Saharan Africa, accounting for 40 percent of total grain imports during the last 14 years.

Without major policy reform and civil stability, several countries in Africa will face severe food problems in the coming decades. The demand for food aid is likely to increase as their purchasing power lags further. The long term food gap in Sub-Saharan Africa is projected to increase to 20 million tons of grain by 2005 (about four times current food aid receipts) just to maintain the current low per capita consumption levels. A larger quantity, as much as 32 million tons, is needed to satisfy minimum nutritional requirements.

Sub-Saharan Africa



Economic Trends and Trade Issues

Economic growth and financial stability have eluded most countries in Sub-Saharan Africa over the past decade. Per capita incomes, already low, have fallen. These trends reflect inappropriate policies, an adverse external environment, and political instability. However, many countries have implemented structural adjustment programs (SAPs) to stimulate the export sector and revive economic growth. [Stacey Rosen and Brian Brubaker]

Food security comes from being able to obtain enough food for the population through imports or domestic production. In many Sub-Saharan countries, food security has not been achieved because of rapid population increases, slow growth in domestic food production, and limited financial capacity to import. To have food security, a country need not produce its own food, but it must have other economic activities that earn money to pay for food imports.

Background

Economic growth and financial stability have eluded most countries in Sub-Saharan Africa over the past decade. Sub-Saharan Africa's per capita income, \$360 in 1990, fell nearly 40 percent between 1980 and 1990. Savings and investment rates, which have significant implications for economic growth, are also headed down. The region's savings-GDP ratio fell from 22 percent to less than 15 percent during 1980-90.

Current account deficits, high interest rates, and borrowing for investment have led to a large accumulation of debt in Sub-Saharan Africa. Total debt, estimated at \$130 billion in 1991, has been increasing relative to the size of the region's economies and currently stands at more than 80 percent of GDP. The debt-export ratio exceeds 400 percent and the debt service ratio (debt service/export earnings) more than doubled during the last decade to 20 percent. The debt/GDP ratio rose continuously through the 1980's.

Because agriculture generally contributes more than 30 percent of GDP, its performance is critical to the performance of the region's economies. With few exceptions, agriculture has performed poorly as growth in food production has often lagged behind growth in population (see *Agricultural Production: Trends and Constraints*). These trends reflect inappropriate policies, an adverse external environment, and political instability.

The poor policy decisions that contributed to declining agricultural productivity covered all facets of the economy from government spending to agriculture to trade. In addition, spending tended to be biased against agriculture as industry was thought to be the engine of growth. Productivity in the agricultural sector was stifled due to low producer prices, lack of inputs, and poor research and extension services. Many of the region's governments engaged in protectionist trade policies that reduced competition from the outside world. The lack of competition reduced productivity, while trade restrictions increased input prices and the cost of capital.

The overvaluation of exchange rates, while providing cheap imports, hurt the competitiveness of the countries' export sectors and contributed to balance of trade deficits. The inability to generate foreign exchange through exports restricted the capacity to import inputs, which in turn hindered economic growth.

Political and social instability are associated with low rates of economic growth (see box entitled *The Costs of Political Instability*). More than half the countries in the region have a poor record with respect to these factors and have experienced falling per capita GDP growth rates from the 1960's to the 1980's. On the other hand, stable countries achieved higher economic growth.

Whether the countries in this region can reverse recent trends is uncertain. However, many countries have taken economic and/or political steps that will help provide a more financially stable future. Many African countries implemented structural adjustment programs in the 1980's to address declining agricultural output, limited commercial import capacity, and stagnating economic growth. The reforms were proposed and supported by the International Monetary Fund (IMF), the World Bank, and donors. Policies undertaken in these programs emphasized demand management, currency devaluation, and privatization of agricultural marketing. Other significant progress has been made in political liberalization. Since 1990, many countries have held presidential and/or parliamentary elections, some for the first time.

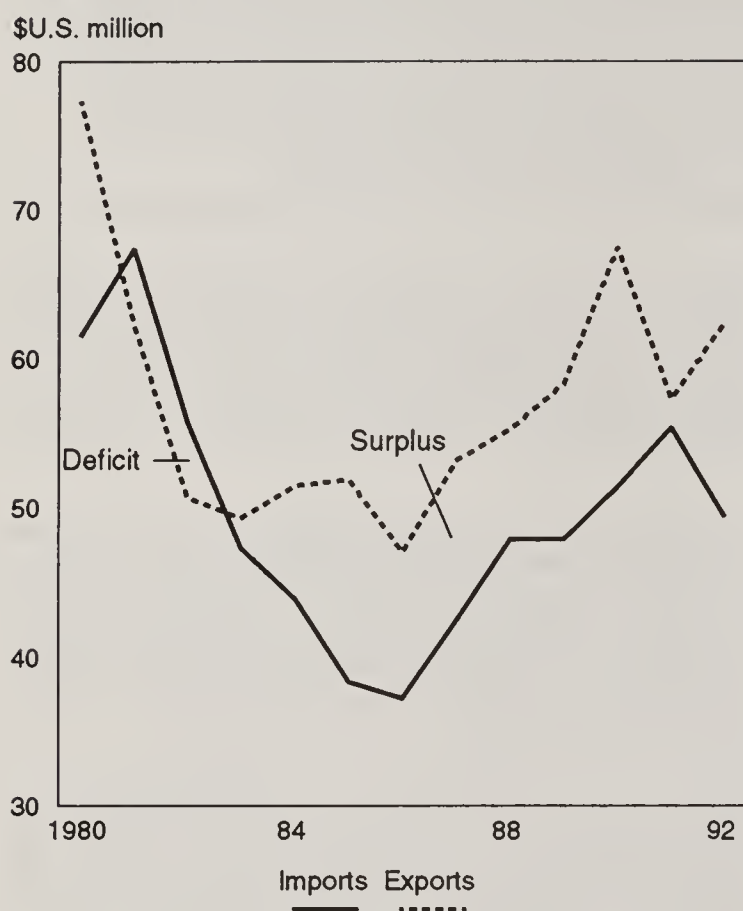
Terms of Trade

The lack of appropriate policy direction exacerbated the effects of deteriorating terms of trade. Sub-Saharan Africa experienced a near 20-percent decline in terms of trade between 1985 and 1991. South Asia and Latin America also saw a decline, but to a lesser extent. In addition, policy reforms in those regions offset some of the adverse effects of the decline.

Trade plays a vital role in the economies of Sub-Saharan countries. The region depends on imports of food, energy, and capital inputs to complement domestic products. Exports are the principal source of financing imports. In Sub-Saharan Africa, the ratio of exports to GDP is 28 percent, compared with 10 percent for South Asia and 18 percent for Latin America.

The region's balance of trade surplus reached \$15 billion in 1980 (fig. 1). Export earnings reached unprecedented levels, stemming principally from the high prices received for oil

Figure 1

Trade Balance

exports. Oil accounts for nearly 40 percent of the region's exports, on average. This large surplus was followed by 2 years of deficits as exports dropped considerably while imports remained high. Aside from oil exports, the region depends heavily on exports of primary agricultural products such as coffee, cocoa, tea, peanut oil, and cotton, whose prices generally have been depressed since 1980 (fig. 2). Since 1983, the region has been in a surplus position that equaled \$13 billion in 1992.

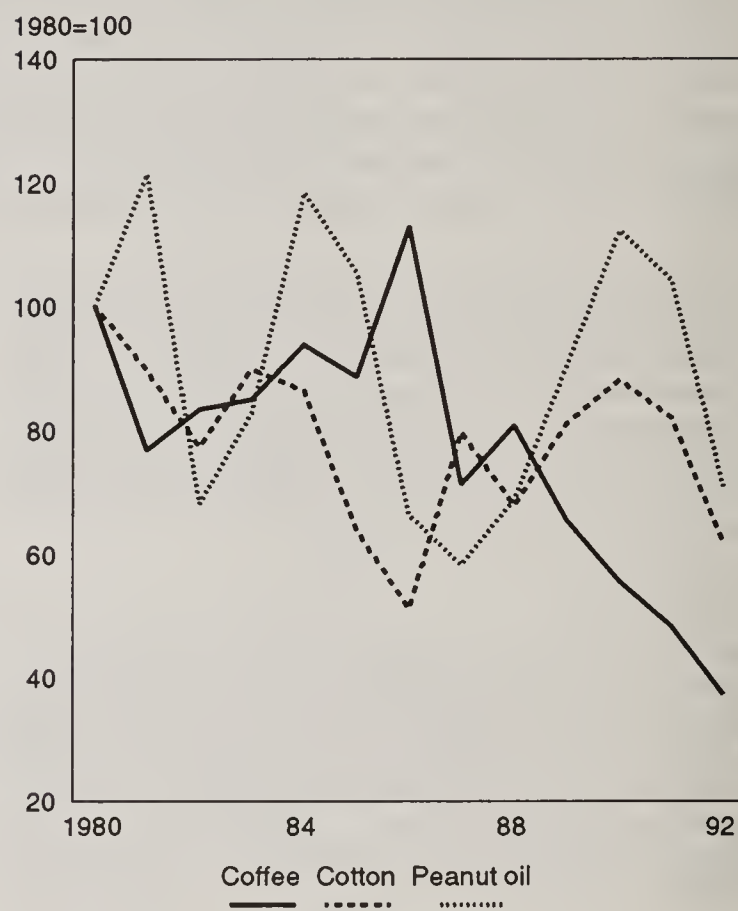
The trade surplus is largely due to the performance of South Africa, which has large mineral (gold and diamonds) and manufacturing sectors (see box entitled *U.S.-South Africa Trade After Sanctions*). Oil exporting Gabon and Cameroon also add to the surplus. Nigeria's oil and Cote d'Ivoire also frequently contribute to the region's trade surplus. Many of the remaining Sub-Saharan African countries run a trade deficit as they depend on a single commodity, whose price has declined, for nearly all export earnings.

Exports

Sub-Saharan exports totaled over \$62 billion in 1992, down 20 percent from the 1980 peak. Nearly 60 percent of Sub-Saharan's exports originate from South Africa and Nigeria (38 and 20 percent).

The major reason for declining export earnings is lower prices rather than reduced volume. Non-fuel commodity prices, in real terms, fell to a record low in 1991. These trends are attributed to slow growth in demand from the developed

Figure 2

World Prices for Major Agricultural Exports

world, inelastic demand for the region's export commodities, and increased competition among suppliers. The lower prices contributed to a 30-percent loss in terms of trade for the Sub-Saharan region between 1985 and 1992.

Export Commodities

Internal market conditions (demand, supply) of Sub-Saharan countries generally have no significant influence on world market prices. Therefore, Sub-Saharan's export earnings are influenced by fluctuations in world commodity prices and by changes in the domestic output of export commodities. Production of agricultural commodities, which many of these exports are, is subject to short-run variation because of uncontrollable factors such as weather. On the demand side, shifts in foreign demand are the primary source of earnings variation.

Coffee

While coffee is Sub-Saharan Africa's most important agricultural export, the region is not the world price setter. Total African output is less than that of Brazil, and therefore coffee prices are mostly determined by production variations in Brazil and other Latin American countries. This is vital when considering how much many countries depend on coffee exports. In Uganda, coffee accounts for nearly 80 percent of export earnings; in Ethiopia, the share is roughly 50 percent.

World coffee prices have been depressed due to an increase in exports following the July 1989 suspension of the quota

system embodied in the International Coffee Agreement. Exporting countries had accumulated large stocks while the quota system was in place. When the system collapsed, these countries exported much of their stocks. The increased shipments were designed primarily to establish evidence of high exports so that the countries would be able to obtain larger quotas if the system were re-established.

Prices have risen since late 1993, partly because several producers, mostly in Latin America, agreed to a coffee retention scheme wherein exporters retain up to 20 percent of their potential exports. Brazil, Colombia, and the Central American countries have implemented the program. Of the African exporters, Uganda and Ethiopia have agreed to implementation. Because of rising prices in 1994, coffee no longer is being retained. This trend is expected to continue due to decreased world supplies following freezes in Brazil.

Cocoa and Tea

Two other important agricultural exports in the region are cocoa and tea. Sub-Saharan Africa is the world's largest producer and exporter of cocoa, accounting for about 60 percent of world exports. Prices peaked in the late 1970's. The 1993 price was less than half the 1980 level, reflecting a build-up of stocks. Prices have improved in 1994 as production growth did not keep pace with rising consumption in importing countries.

Africa accounts for 13 percent of world tea production. Current prices are about two-thirds of the peak achieved in 1984. The low prices stem from higher output and stagnant or declining demand. The share of the beverage market held by soft drinks and juices has increased considerably in U.S. and European markets, at the expense of coffee and tea.

Metals

Metals are another important source of export earnings for many countries. While metal prices have fluctuated during the last decade, recent nominal prices are unchanged from 1980. This trend has adversely affected Zambia's economy, in particular, where copper accounts for 75 percent of export earnings. The development of substitutes has reduced demand for many metals.

Oil

Oil is a major export earner for several Sub-Saharan countries, including Nigeria, Cameroon, Angola, Congo, and Gabon. World demand for oil fell slightly in the early 1980's, increased 2.5 percent per year during 1985-89, and remained steady for the past few years. Currently, prices are half their 1980 level. Demand for oil is expected to rise 1.5 percent per year during 1995-2000. Consequently, real prices are expected to rise, and by 2000 approach levels achieved in the mid-1980's (5).

Policy

Government policies significantly affect exports and, until recently, there were very few producer incentives for export crops. Because of the IMF and World Bank structural adjustment programs (SAPs), many governments have improved

export incentives. Following many years of declining real producer prices, recent increases have exceeded inflation. Research and extension services have been improved. In addition, there have been efforts to improve road systems in order to facilitate the marketing of crops. The effects of these reforms should encourage production and improve marketing. Also, continued currency devaluations will make the region's exports more competitive in the world market (see *African Franc Zone Countries Devalue*).

Efforts to diversify exports will help stimulate earnings growth. Commodity diversification would improve export performance because a decline in the price or the volume of one commodity would have a less disruptive impact on the country's overall receipts. Examination of structural factors (such as export composition, commodity diversification, and export market diversification) showed that commodity diversification is the most important variable that could significantly improve export earnings growth and reduce export instability (3).

Imports

Sub-Saharan Africa's total imports were almost \$50 billion in 1992. After peaking at \$70 billion in 1980, imports dropped every year throughout the early and mid-1980's, only to gradually climb in the early 1990's. Lower imports are due to foreign exchange constraints created by reduced export earnings and credit availability. Other causes of declining imports include the SAPs, which were intended to lower imports to improve countries' balance of payments positions. In addition, many African countries have devalued their currencies, which has made imports relatively expensive.

As is the case for exports, West and Southern Africa are the region's major importers, with Nigeria and South Africa importing the largest amount. Declining oil revenues have forced Nigeria to cut imports and hence its current imports are less than half of their 1981 peak. Lower mineral prices have had a similar effect on South Africa. During much of the last decade, the East, Central, and Indian Ocean countries have maintained historical import levels.

Import Composition

In 1990, the region's food imports totaled \$7.1 billion, accounting for 14.2 percent of all goods imported. Food imports consist mainly of cereals, including wheat, rice, corn, and sorghum. These grains account for about 60 percent of the typical Sub-Saharan diet.

In 1992, wheat comprised just over half of all grain imports, with corn accounting for 16 percent, and rice 10 percent. Wheat, and to a lesser extent rice, are not traditionally grown in Sub-Saharan Africa. However, as more people have become exposed to these imported commodities, they have become the preferred grains over locally grown crops such as millet and sorghum. Because wheat and rice production has lagged behind consumer demand, imports have steadily risen.

Nonfood imports include consumer items, energy and fuels, and capital inputs. In the late 1980's, consumer goods, many

The Costs of Political Instability

The human and economic costs of political instability and strife in Sub-Saharan Africa are staggering. A large number of countries are affected, including some of the largest and most densely populated. According to a World Bank report, Sub-Saharan Africa, with one-tenth of the world's population, accounts for about a third (or almost 4 million) of the world's officially recognized refugees (1). In addition, the region has another 12 million or so displaced persons. Although some countries are on the way to resolving their conflicts, they continue to suffer the residual costs.

Rwanda and Burundi are the most recent of many cases where political instability has triggered tribal conflict on a massive scale, resulting in disruption of agricultural production and economic development. The political events that triggered the killing in Rwanda and Burundi happened to coincide with the failure of the rains and sharp drops in food production.

In Burundi, the president was assassinated in a coup attempt in October 1993. A delay in the onset of the rains caused sowing of crops to be interrupted by ethnic clashes just as it was getting underway in late October. Similarly in Rwanda, the recent food crisis had its origin with the death of the country's president in a plane crash in April 1994. As in Burundi, the incident was followed by a wave of ethnic violence between the majority Hutus and minority Tutsis. As a result, more than a million people have fled the country. An estimated 500,000 people have been killed. Here again, the situation has been aggravated by failure of the rains, harming what food production could still be expected from areas spared the worst of the violence. Very low rainfall in September and October 1993 led to a reduction in cropped areas and sharp declines in yields. Shortages of inputs and massive population movements mean that Rwanda's second-season crops will be inadequate to feed the population of nearly 8 million. Lack of foreign exchange in both Burundi and Rwanda rules out commercial imports.

Armed conflicts in Somalia, Sudan, Angola, and Liberia continue to claim lives and postpone development. In Somalia after the fall of the Siad Barre government in January 1991, lawlessness spread in the countryside, preventing farmers and herders from carrying on their normal activities. Food production suffered, movement became unsafe, and markets were disrupted. This resulted in a famine. The continued fighting among clan warlords exacerbated the problem, and control over food aid itself became a weapon of war. While the security situation has improved and most agricultural activities have resumed, the political environment is not stable and the future remains uncertain.

In southern Sudan, where a civil and religious war has been raging for almost a decade, droughts come and go, but the principal cause of hunger is the continuing war. The war has disrupted both agricultural activities and the delivery of food aid and relief supplies.

Angola's civil war resumed after both sides disputed the results of the September 1992 elections, and continues to the present. The war results in back-and-forth changes of

control over large areas of the country, with consequent disruption of production, transportation, and marketing. Towns that hold out against one side or the other find themselves endangered by localized famine if emergency food aid cannot be arranged with assistance from international relief agencies.

Despite a record cereals crop in Zaire in 1993, the food supply situation in urban areas remains precarious. The breakdown of central government authority has resulted in riots and looting in the urban areas, which in turn have disrupted food marketing activities.

Since the beginning of Liberia's civil war in 1990, virtually all economic activity has been curtailed and nearly half of the country's 2.5 million people has been displaced. While a ceasefire agreement in August 1993 allowed for the movement of food to the displaced, insecurity persists in many areas. Grain output in 1993 was only 25 percent of normal. As a result, high rates of malnutrition and mortality persist.

One country where conflict is on its way to resolution is Mozambique. This eases the burden not only on the domestic government but also on neighboring countries. The return of peace will particularly benefit Malawi, which at the height of the fighting provided temporary refuge for more than half a million displaced persons from Mozambique. These persons have begun to return home, although more time will be required before they can be productive again.

The costs of such conflicts cut across all sectors of the economy. Aside from the diversion of resources that expenditures on arms entails, infrastructure has been destroyed in many cases. In Liberia, for example, rubber plantations were deliberately burned by one faction or another, and those that survived could not be tended. As a result, rubber production declined from 106,000 tons in 1989 to 10,000 tons in 1993. Declining exports in the long term and less ability to pay for imports are other costs of political instability.

In addition to lost resources, destroyed assets, and foregone income, the loss of lives and human potential constitutes an incalculable cost. This cost is made up of human suffering and misery, exposure to disease, the social and economic impact of loss of government services, and the stunted potential from famine and malnutrition.

Contrary to the trend toward political instability in many parts of Africa, the political change in South Africa leading up to the April elections and their followup comes as an especially encouraging sign. The peaceful transition of power, so far, is expected to produce a lowering of political tension and better prospects for economic security in the region. [Arthur Dommen]

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considered luxury items, accounted for only 25 percent of the region's total import value.

With imports of luxury items reduced significantly since the 1960's, further cuts in imports may either fall on food or raw materials. Government priorities vary somewhat from country to country. However, food availability usually heads the list because any domestic production shortfall must be filled with imports. In countries with declining production trends, scarcities lead to growing import dependency. Increased food imports crowd out spending on raw materials and spare parts that propel an economy forward, raising concerns over a country's economic health. However, to allow food shortages to persist is to take serious political risks. Governments are committed to providing a basic supply of food and are not likely to cut food imports. Therefore, most of the cuts are likely to come in the form of raw materials and spare parts.

Trading Partners

The industrial countries remain Sub-Saharan Africa's major trading partners. In the late 1970's, the United States, European Union (EU), and Australia supplied approximately 80 percent of the region's imports. However, a decade later, these same countries accounted for only 60 percent of Sub-Saharan Africa's imports. The decline is attributed to increasing oil prices, which raised the value of the region's oil imports from other developing countries, such as Algeria.

Interregional exports, as well as exports to other developing countries, are limited. The industrial countries are a market for close to 80 percent of the region's exports. The high concentration of exports in a single major market or country (such as the EU), exposes the exporter to the economic and political whims of that country. Changing demand in one export market will then have a more significant impact on export earnings than if the export destinations were more diversified.

In terms of revenue generated, the top five Sub-Saharan exporters in 1992 were South Africa, Nigeria, Cote d'Ivoire, Angola, and Gabon. South Africa, Nigeria, and Cote d'Ivoire, along with Kenya and Zimbabwe, were the major importers during the same year. In most instances, the EU was the most active trading partner, followed by the United States and Japan. The United States absorbed nearly 22 percent of all exports from the principal exporting nations while it supplied 11.5 percent of all imports for the top five importers in the region.

In terms of agricultural trade, the United States runs a slight trade surplus with the Sub-Saharan region while the EU has a substantial deficit. In 1992, the United States exported more than \$1 billion of agricultural commodities to the region, mostly to Nigeria, South Africa, Ethiopia, and Mozambique. Most U.S. imports from Sub-Saharan Africa consisted of cocoa. The United States imported mostly from Cote d'Ivoire, Kenya, and Zimbabwe. Only 1 percent of all U.S. imports from developing nations came from Sub-Saharan Africa in 1992. However, the region was a market for 5.5 percent of U.S. exports to the developing world.

Since the region engages in a considerable amount of trade with industrialized nations, a certain degree of dependency exists. Therefore, Sub-Saharan Africa is concerned about the value of the dollar (which changes the relative costs and returns from trade) and the removal of the preferential status for Sub-Saharan exports by both the United States and the EU.

Trade Outlook

Sub-Saharan Africa's trade outlook depends on key external factors such as growth of export markets, terms of trade, foreign financial flows, and access to industrial markets (see *Implications of the Removal of Trade Preferences*). The internal factors are weather variations in countries exporting agricultural commodities, allocation of government resources, policy implementation, marketing infrastructure, input availability, and civil strife.

Export Outlook

The performance of the export sector, depending on its size, will directly affect a country's economic growth. Exports' main contribution to overall economic performance is to provide financial support to import essential commodities that are not produced domestically but are critical for the performance of import-dependent sectors. If a country is able to build a strong, diversified export sector to finance imports, as in the case of some Asian countries, long-term economic growth is possible. On the other hand, poor performance of the export sector means constrained foreign exchange availability, reduced imports, including inputs, and finally, a decline in economic growth unless foreign credit is used to support imports.

Most of the region's exports are agricultural and characterized by production and price instability and earnings volatility. Demand for the region's primary exports is not expected to expand significantly in the near term. Furthermore, the slow growth in petroleum consumption suggests that oil prices are unlikely to regain the levels of the late 1970's. The World Bank projects that by the year 2000, nonoil real prices will be close to their low 1985 levels (4). This means that purchasing power will remain weak.

Outlook for Imports

Results of a USDA study indicate that the response of imports to a change in credit and export earnings is positive and very strong (2). This means that reductions in these variables will result in some degree of import reduction. If recent trends continue, further import cuts can be expected. Since expanding about 20-fold between the late 1960's and 1983, capital flows have stagnated throughout the late 1980's and into the 1990's.

The study also found that food import demand was relatively inelastic, meaning that the decline in food imports is proportionately less than the decline in the total value of imports. Therefore, when foreign exchange is limited, nonfood imports will be reduced rather than food imports. Recent trends support this finding. According to the USDA study, reducing imported inputs will have a significant impact on export

earnings and will adversely affect the export sector. An estimation of economic growth for 25 African countries determined that export performance had a positive and significant effect on economic growth. Therefore, if recent trends continue and imports of capital inputs must be reduced, the export sector will suffer and thus hinder economic growth.

The International Environment and Credit Availability

Government policies and economic performance in developed countries play a key role in Sub-Saharan Africa's financial situation. Economic growth and inflation, protectionism, and changes in interest rates and exchange rates are the most significant factors at play. Reduced economic activity in industrial countries results in downward pressure on the prices of primary commodities. Therefore, accelerated growth in industrial economies improves the terms of trade of Sub-Saharan exporters, particularly those of primary products as opposed to manufactures. Faster growth of real incomes in industrial countries raises the demand for developing country exports. According to the IMF, a 1-percent increase in the real GNP in industrial nations will increase the purchasing power of exports by nonoil developing countries by 3.4 percent (1).

The impact of the General Agreement on Tariffs and Trade (GATT) on Sub-Saharan Africa will be small. The net food importers may suffer from the expected higher food prices. On the other hand, these countries should benefit from increased world trade and faster growth in the world economy. Also, in the long term, higher food prices should stimulate domestic food production.

With increased debt service burdens in the region and donor concerns about the inefficiency of credit use, it is unlikely that credit flows will exceed historical levels. Creditworthiness depends on a number of factors, including the borrower's export performance, implementation of domestic fiscal policies, economic growth, international liquidity, and the debt service burden. Implementing fiscal policies appears to be the only area in which the region has made progress in improving its creditworthiness.

Continuation of this trend portends further deterioration of the current account, which reduces investment opportunities to develop domestic industries. Official development assistance (ODA) to Sub-Saharan Africa declined about 2 percent between 1990 and 1991 to \$16.2 billion. Conversely, ODA to South Asia increased 25 percent, while Latin America saw a 10-percent increase. However, the Sub-Saharan region still has by far the largest receipts per capita and as a percentage of GDP.

Conclusion

Many constraints that hindered economic growth in the past have been removed due to policy implementation. To improve economic performance in the future, policy changes should focus on reforming the financial sector, liberalizing the trade system, and removing remaining constraints on private sector participation in agriculture, which is expected to stimulate earnings for export crops. The developed world should support these efforts by ensuring market access for African exports, supplying technical assistance, and providing financing for these countries.

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U.S.—South Africa Trade After Sanctions

In 1985 and 1986 the U.S. Congress imposed trade sanctions against South Africa to protest the country's racial policies. The EU and Japan also banned imports of selected commodities. Of South Africa's major trading partners, the United States imposed the severest measures, banning imports of agricultural products, gold coins, coal, steel, iron, uranium, and textiles. U.S. agricultural exports to South Africa were not prohibited. Trade sanctions began to be removed in 1990 after the government announced the end of apartheid and scheduled a free election for April 1994.

Markets for South African exports, valued at \$24 billion, changed little during the sanctions period. The EU, Japan, and the United States remained the major markets. In total trade, South Africa ran a surplus with imports running at about \$17 billion. The same three countries were the primary sources of South Africa's imports. The surge in U.S. exports

in 1992 was caused by drought-related production shortfalls in South Africa.

Agricultural trade data are summarized for the 1985-92 period covering the 2 years before and after the sanctions were in place (fig. 3). The major markets for South Africa's agricultural exports were the EU and Japan. Total agricultural exports amounted to about \$1.6 billion. Tight supplies of corn and sugar in 1992 prevented South Africa from expanding these traditional exports. The balance of agricultural trade was in the favor of South Africa with imports running at about \$1 billion. The effects of the drought in Southern Africa are noted in the sharp rise in 1992 corn imports, especially from the United States.

U.S. agricultural trade with South Africa has increased since 1990 (table 1). U.S. agricultural imports from South Africa

Continued on next page

fell from \$67 million in 1986 to \$3 million in 1987 after sanctions took effect. Following the removal of the sanctions, imports increased eightfold during 1991-92 to \$49 million. Grains are South Africa's major agricultural import. The large shipments of corn in 1992 demonstrate the country's dependence on the international market to buffer drought-related shortfalls.

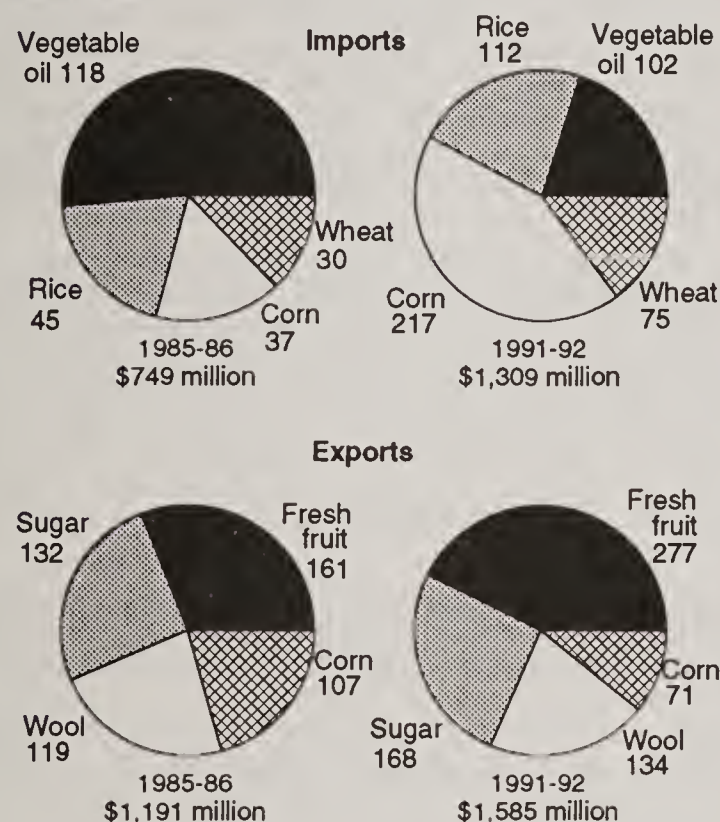
The external sector will play a key role in any growth path envisaged for South Africa. After a decade of trade sanc-

tions and 7 years of financial sanctions, South Africa is poised to reenter international markets. In this regard, it will be important to maintain an exchange and trade system that is transparent and nondistorting. At present, South Africa's trade regime is out of line with both changed external economic circumstances and a new domestic consensus on the appropriate role of trade in growth and development. There is a widespread perception that the declining growth trend of recent years is attributable to an inward-looking trade regime, and that trade in the future must be used as an engine of growth.

Figure 3

South Africa's Agricultural Trade

Million dollars



After 1985, sanctions drove the country toward a policy of self-sufficiency. South Africa's protective import system consists of customs tariffs, quantitative import licensing, and a variety of other mechanisms. Duties were selectively imposed to protect domestic producers against low-cost foreign competition. Tariff rates escalate with the degree of processing. The average rate in 1990 for primary products was 2.5 percent, whereas that for manufactures was about 27 percent. Although quantitative import controls gradually have been replaced by tariffs, licensing remains the main instrument of control in agriculture, forestry, and fisheries, covering three-quarters of the tariff lines. Import liberalization, which was stalled by the sanctions, was resumed in 1989. At the end of 1992, direct controls covered about 15 percent of all tariff lines, largely in agriculture and food products and textiles.

In the context of a post-apartheid economic system, there is broad support for liberalizing the import regime and reorienting trade policy toward export promotion. The General Export Incentive Scheme (GEIS), introduced in 1990, subsidizes exports through customs duty rebates and income tax relief for large-scale export-oriented projects. GEIS helps firms offset the price disadvantage that South African exporters face in the international markets, including that caused by the anti-export bias inherent in the import protection system. The expansion of exports and manufactures has far outpaced overall economic growth during the last 30 years. The recent recession was accompanied by a sharp expansion in the exports of manufactured products. [Gene Mathia and Margaret Missiaen]

Table 1--U.S. agricultural trade with South Africa

	1985	1986	1987*	1988*	1989*	1990*	1991	1992	1993
\$ million									
Total U.S. exports	1,191	1,158	1,253	1,688	1,659	1,733	2,131	2,470	NA
Agricultural exports	108	70	55	78	56	80	83	468	243
Animals & animal prods.	21	14	10	21	8	11	11	17	9
Wheat	2	18	0	0	0	14	0	8	86
Rice	25	19	17	33	30	34	45	41	37
Corn	30	0	0	0	0	0	2	369	76
Oilseeds & prods.	11	3	4	4	3	7	3	7	16
Other	41	29	34	41	23	26	33	43	28
Total U.S. imports	2,060	2,476	1,339	1,513	1,531	1,701	1,883	1,888	NA
Agricultural imports	98	67	3	5	2	3	6	49	57
Wool	8	8	0	0	0	0	0	1	1
Fruits & preps.	33	20	0	0	0	0	0	7	13
Fruit juice	9	10	0	0	0	0	2	13	16
Sugar & prods.	28	15	0	0	0	0	0	13	11
Other	20	15	3	5	2	3	5	14	16

* Trade sanctions prohibited imports of agricultural products from South Africa during these years.
Source: Foreign Agricultural Trade of the United States.

African Franc Zone Countries Devalue

In January 1994, the CFA (Communaute Financiere Africaine) franc was devalued from 50 to 100 CFAF per 1 French franc. The African franc zone, with 14 members, was created nearly 50 years ago. The common currency, the CFA franc, was freely convertible, pegged to the French franc at a fixed rate, and supported by the French Treasury. It provided a solid anchor for the economic and financial policies of its members. These African countries benefited from a long period of stability and an inflation rate comparable to that of the industrial countries, while enjoying sustained economic growth until the early 1980's.

CFA franc zone members are Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Mali, Niger, Senegal, and Togo. Since 1985, economic conditions in the member states deteriorated due to two major shocks: 1) the external competitiveness of the zone weakened due to the appreciation of the French franc against the currencies of the zone's trading partners, and 2) the terms of trade deteriorated 45 percent because of falling world prices for its major exports--coffee, cocoa, and petroleum.

Despite attempts at internal adjustment, economic and financial conditions worsened, with per capita incomes falling and financing gaps widening. Rising production costs, especially wage costs, contributed to a drop in profitability, particularly in the public enterprise sector. External payment arrears accumulated, creating distortions for the productive sector and weakening the banking system. The attractiveness of the CFA countries to foreign investors diminished and capital flight increased.

To address these problems, several countries tried to strengthen their internal adjustment strategies, but these measures were inadequate to deal with the large imbalances. While the CFA countries maintained an internal adjustment strategy at the cost of negative growth over the past 5 years, the economies of other African countries expanded by 4 percent on average. Economic growth in Ghana and Nigeria, the zone's closest neighbors, exceeded 5 percent.

The member countries decided that a substantial devaluation, accompanied by a coherent set of policy reforms, was the best way to sustainable growth. The devaluation is not being carried out in isolation, but will be accompanied by programs of fiscal, wage and monetary, and structural measures to restore competitiveness. The realignment is expected to increase productivity. This strategy should enable member countries to regain a level of competitiveness that will allow them to benefit from their comparative advantages. The devaluation should shift resources to the more competitive sectors of the economy, including agriculture. Devaluation and public investment will permit higher domestic producer prices for export crops, but should also allow for an increase in productivity.

Clearly, the devaluation will lead to higher prices for imported goods. It is important that this impact be contained so that the needed correction in relative prices is realized and inflation returns rapidly to its pre-devaluation level. The return to stability will hinge on rigorous fiscal, wage, and monetary policies, as well as a reduction in import duties and taxes.

The individual country governments have responded differently to the devaluation, depending on the extent of price controls. For example, in Senegal, the government will con-

tinue its price liberalization efforts and will not introduce new price controls, but it has increased the commodity prices that it still sets. The producer price of peanuts was increased 43 percent and that of seed cotton 30 percent. For essential consumer goods, the price of rice was raised 33 percent, that of flour 30 percent, and those of vegetable oil and peanut oil 25 percent.

In Burkina, the economy was adversely affected by the economic decline in the CFAF zone as a whole, and particularly by lagging workers' remittances from Cote d'Ivoire. Improved competitiveness should provide the impetus for growth in a number of sectors of the economy. In agriculture, it will restore the viability of cotton production; allow local rice and sugar production to compete better with imports without recourse to tariffs; allow Burkinabe stockbreeders to compete against imports from the EU and South America and to recapture their share in the regional market; and promote diversification into high-value agricultural products and exports, notably fruits and vegetables.

A wide range of price controls was put into place in Burkina immediately after the devaluation. Since then, the government has been lifting these controls and allowing most food prices to reflect the change in the parity. The retail price of imported rice was increased 23 percent to CFAF 210 per kilogram and will be maintained at that level for 6 months. The price of cotton, the major export crop, was increased from 80 to 112 CFAF per kilogram. The paddy price will no longer be set, and prices of other agricultural products will continue to be market determined.

Despite progress in implementing key parts of an economic program in Cote d'Ivoire, recent economic developments show that the Ivorian economy continues to suffer from substantial fiscal and balance of payments imbalances. The government's price policies are guided by the principle of unrestricted competition. With the exception of a few sensitive goods, most prices were deregulated in 1991 and 1992. However, following the devaluation, the government ordered a price freeze on 34 goods and services for a maximum of 3 months. Prices for the main petroleum products were immediately raised 10-15 percent. The retail price of imported rice was also increased by 10 percent.

Producer prices for cocoa and coffee were increased 30 and 20 percent, and will be raised an additional 20 percent at the beginning of the next crop year in October 1994. Producer prices for these products will then vary according to world prices. Producer prices for cotton were increased 50 percent.

Since 1986, the Malian government has pursued a policy of price liberalization, which has led to the total deregulation of all prices except for key utilities. The government's approach in dealing with the price effects of devaluation is to avoid reinstating price controls, to allow full passthrough of the parity change while mitigating the price impact through cuts in taxes and tariffs. In the cotton sector, the government will sign a revised contract with producers and the cotton company. The key elements are: 1) a 35-percent increase in the producer price of first-quality cotton for the 1994/95 crop year; 2) continued price differentiation across qualities of cotton; 3) continued reduction in production costs; 4) greater farmer participation in the cotton stabilization fund; and 5) farmer and village level association access to capital. [Margaret Missiaen]

Implications of the Removal of Trade Preferences: Summary of a World Bank Study

A recent study by Alexander Yeats describes the implications of a reduction in GSP (Generalized System of Preferences) under multilateral trade negotiations--such as the General Agreement on Tariffs and Trade (GATT)--for Sub-Saharan countries' trade (2). In 1982, the United Nations Conference on Trade and Development (UNCTAD) argued that the Tokyo Round agreement actually resulted in trade losses for some developing countries due to erosion in the value of trade preferences that they received (1). Yeats' analysis suggests that the same type of situation might well apply to the Sub-Saharan Africa countries' trade prospects when the Uruguay Round agreement is implemented later in 1994.

The developing countries of Sub-Saharan Africa receive numerous trade preferences under the existing tariff structure. These preferences, in the form of reduced tariffs on exports to markets such as the European Union (EU), the United States, and Japan, have played an important role in promoting Sub-Saharan exports to these regions. The GATT agreement, which focuses on reducing tariff rates on a most favored nation (MFN) basis (i.e., reductions in the non-preferential rates) may reduce the relative advantage *vis a vis* other countries' exports that the countries of Sub-Saharan Africa now enjoy.

About 80 percent of Sub-Saharan Africa's exports go to developed countries, with the EU alone accounting for 47 percent. Important export products include raw materials (oil, copper, gold, diamonds, other minerals) and non-temperate zone foodstuffs (cocoa, coffee, sugar and tea).

An examination of EU tariff rates demonstrates the significance of the trade preferences that Sub-Saharan countries

receive. Preferences result in at least 97 percent of each country's exports entering the EU duty free. The average tariff facing Sub-Saharan African exports typically ranges from zero to three-tenths of a percent. Comparison of these rates to those paid by other exporters reveals that every country in Sub-Saharan Africa faces tariff rates that are, on average, below those faced by exporters from other regions.

The GATT agreement is expected to reduce MFN tariff rates by about 30 percent. According to the World Bank's SMART (Software for Market Restrictions and Trade) trade projection model, an across-the-board 30-percent cut in MFN tariff rates by the EU alone would cost Sub-Saharan Africa about \$70 million a year in lost exports (about 0.6 percent of the value of trade with the EU).

Dynamic income effects (which Yeats did not consider) and reductions in non-tariff barriers, particularly in sugar, textiles, and clothing, may to some extent mitigate the trade losses experienced by Sub-Saharan Africa due to the MFN tariff rate reductions. Despite these facts, Yeats concludes that the GATT agreement could result in smaller rather than larger exports. [Jim Stout]

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Agricultural Production: Trends and Constraints

Agricultural growth in Sub-Saharan Africa has lagged behind population growth. Output has been constrained by environmental problems, unfavorable climate, civil strife, poor infrastructure, a lack of inputs, and inadequate producer incentives. The only option for sustainable production growth is to increase yields. While improved production practices, development of rural infrastructure, and higher producer prices may help achieve this goal, weather will continue to be a major factor affecting growth. [Shahla Shapouri and Stacey Rosen]

The varied ecological conditions in Sub-Saharan Africa support agricultural diversity. Grains, including sorghum, millet, corn, and rice, are the most important crops grown. In most areas these grains are intercropped with secondary crops such as cowpeas, beans, and vegetables. Root crops, principally cassava, are widely grown. Important cash crops include coffee, cocoa, tea, cotton, tobacco, and peanuts.

Agricultural Production Performance

During the 1980's, agricultural growth in Sub-Saharan Africa measured roughly 2.5 percent per year (6). Given the region's population growth rate of 3 percent, agricultural output declined in per capita terms. Performance of sub-sectors such as food and livestock followed similar growth paths. While

this growth matches averages for the world, it is lower than the increase experienced in other developing regions.

Factors Affecting Production

Agricultural production growth in Sub-Saharan Africa has been constrained by government policies, civil strife, poor infrastructure, a lack of inputs, environmental problems, and an unfavorable climate.

Policies

Given the importance of agriculture in employment, income, and export earnings, policy intervention in the sector has been widespread. Governments have intervened in all stages of production, consumption, and trade of output as well as inputs.

The value of transfers, such as price supports, from government policies to producers has been estimated using producer subsidy equivalents (PSE's). A PSE is the ratio between the total value of policy transfers to producers to total producer revenue. PSE's illustrate the relative importance of various government policies on producer revenue. These policies reflect the changing level of government intervention in the sector (fig. 4).

Government policies that favor urban consumers have often stifled agricultural development in Africa. Food prices have historically been held below market levels to benefit politically influential urban consumers. These low prices provided a disincentive to domestic production. To control prices,

governments relied on marketing boards to buy, store, and sell crops at government-set prices. The boards were characterized by overstaffing, inadequate budgets, and poor management.

Exchange rate policies supporting overvalued currencies indirectly tax farmers and act as a disincentive to export crop production, thereby diminishing foreign currency earnings. Also, overvalued currencies make imported foods less expensive than domestically produced foods, further discouraging farmers from producing. Inaccessibility to extension services, inputs and credit, and government emphasis on industry also have stymied agricultural production.

Many countries are implementing reform programs aimed at improving producers' access to inputs, raising producer prices, and increasing private sector participation in marketing. Improvements in the policy environment are expected to stimulate production. However, the new policies have not been in place long enough to significantly improve production trends.

Political Conflicts

Civil war and/or disturbances in several countries have disrupted agricultural activities. In addition, they pose challenges of rehabilitating agricultural sectors disrupted by the dispersal of farming populations from their land, loss of crops and livestock, exhaustion of seed supplies, cutting of trees, and laying of mines on roads and in fields.

Limited Use of New Technology

Poor production performance is rooted in poor yields. Corn is a staple crop for many African countries, particularly in East and Southern Africa, and yet the region's corn yields are only 40 percent of the world average. Limited resources, low input use, and little new technology adoption are the principal factors constraining yield potential in these countries. Fertilizer use in Sub-Saharan Africa is lower than in any other region in the world (see *Fertilizer Consumption Remains Low*). Arable land as a percent of total land area averages about 5 percent in this region as opposed to 10 percent for the world. This limited amount of arable land has forced producers to farm too intensively, thereby draining nutrients. In addition, it has driven farmers to marginal lands where yield potential is even lower.

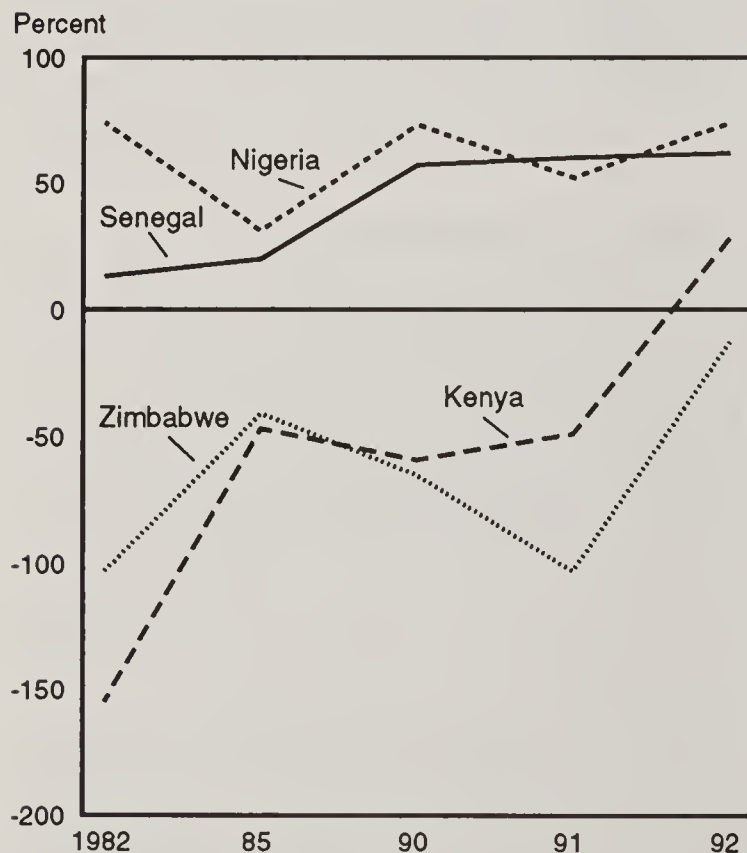
The use of capital inputs is also very low. On average, there are nearly 20 tractors per 1,000 hectares of arable land in use in the world. In Africa, the number is 3.4, compared with the developing countries of Latin America and Asia, where there are 11 and 7 tractors for every 1,000 hectares of arable land (3).

Environmental Problems

Sub-Saharan Africa faces the challenge of achieving multiple important goals: meeting basic human needs, stabilizing population, encouraging economic development, and conserving natural resources for future growth and populations. This region relies heavily on its natural resource base for sustenance and economic growth. Since much of the population resides in rural areas, resource degradation is keenly felt by

Figure 4

Producer Subsidy Equivalents



A PSE is the total value of policy transfers to producers as a percent of producer revenue.

many people (see *Environmental Problems and Resource Constraints*).

Traditional land tenure arrangements have, to a certain extent, contributed to this degradation. Historically, Sub-Saharan farmers did not have permanent transferable title to the land they cultivated or grazed. Often in these common property regimes, the goal is to maximize use of the available resources in the short term without regard for the longer term consequences. This trend has immediate effects on loss of soil, loss of tree cover, and desertification (see *Land Tenure in Sub-Saharan Africa*).

Weather Variability

Drought is a chronic problem for producers. Large areas of the continent outside the forest zone have short growing seasons and highly variable rainfall. Soils are low in organic matter, which limits their moisture retention capabilities and further reduces the supply of water to growing plants. Droughts affect food crops in the short term and tree crops and livestock in the longer term. For example, after a severe drought has reduced cattle numbers, it may take 5-10 years of plentiful rainfall to stimulate regrowth of pastures to return livestock populations to their original level.

Variability of production, particularly the shortfalls (or instances when production falls below trend) often translate into a food emergency. Grain production variation was calculated for the period 1970-93 using the coefficient of vari-

ation, which measures the average variation of production around the trend. Average variation of production from trend in Sub-Saharan Africa was 6.3 percent (fig. 5). The shortfall index is defined as the sum of the values of shortfalls (actual minus expected values) divided by the sum of the actual values of grain production. The shortfall index calculated for 1970-93 averaged 2.3 percent (appendix table 1).

While these variations and shortfalls are small for the region as a whole, those for sub-regions or single countries are higher and are potentially a cause for concern. The combination of low production growth and high variability can translate into large food deficits and increased demand for imports.

Given that rainfall in these countries can be highly variable, irrigated area could reduce production shortfalls when rainfall is inadequate. However, limited water resources and capital mean that only about 6 percent of arable land is irrigated. This is low even when compared to other developing regions. In Latin America, 12 percent of arable land is irrigated and nearly 38 percent is irrigated in Asia. The world average is nearly 18 percent (3).

Regional and Country Situations

Coastal West Africa

The countries of West Africa (Benin, Ghana, Guinea, Cote d'Ivoire, Liberia, Nigeria, Sierra Leone, and Togo) share many features based on their geographical location, but show significant variation in population size, natural resources, level

Figure 5

Grain Production: Actual Versus Trend

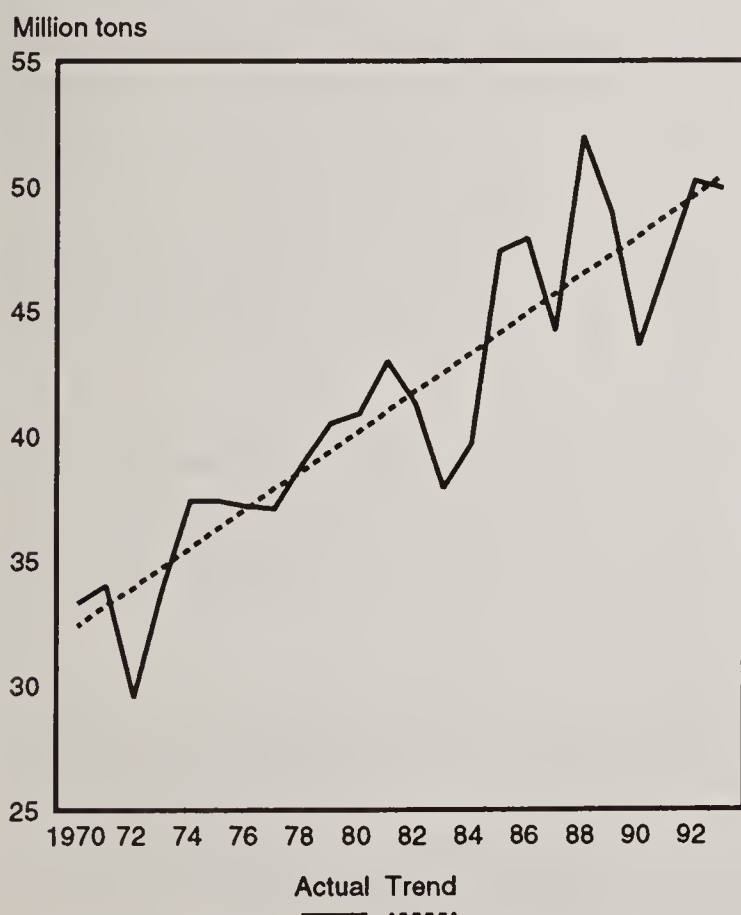


Table 2--West Africa: Index of production

Country/variable	1985	1990	1991	1992	1993
1979-81=100					
Cote d'Ivoire:					
Total agriculture	117.5	137.2	137.3	135.8	133.0
Per cap. agriculture	97.0	93.9	90.5	86.3	81.4
Total food	119.9	141.0	145.7	149.5	140.9
Per capita food	98.9	96.5	96.0	94.9	86.2
Ghana:					
Total agriculture	123.2	127.4	158.8	161.8	163.9
Per cap. agriculture	103.2	91.3	110.4	109.1	107.2
Total food	125.1	128.9	160.4	163.4	165.4
Per capita food	104.8	92.3	111.4	110.1	108.2
Nigeria:					
Total agriculture	117.9	164.0	172.7	187.6	194.7
Per cap. agriculture	100.4	118.5	120.8	127.1	127.9
Total food	118.1	164.2	172.4	187.5	194.6
Per capita food	100.7	118.6	120.6	127.1	127.9

Source: (3).

Table 3--Nigeria: Producer Subsidy Equivalents

	1982	1985	1990	1991	1992
Percent					
Nigeria:					
Wheat	31	-18	69	62	72
Rice	70	0	74	39	109
Corn	93	44	70	47	62
Sorghum	59	30	72	52	61
Cotton lint	-9	-46	151	133	105
Total	74	31	73	52	74

Source: (2).

Figure 6

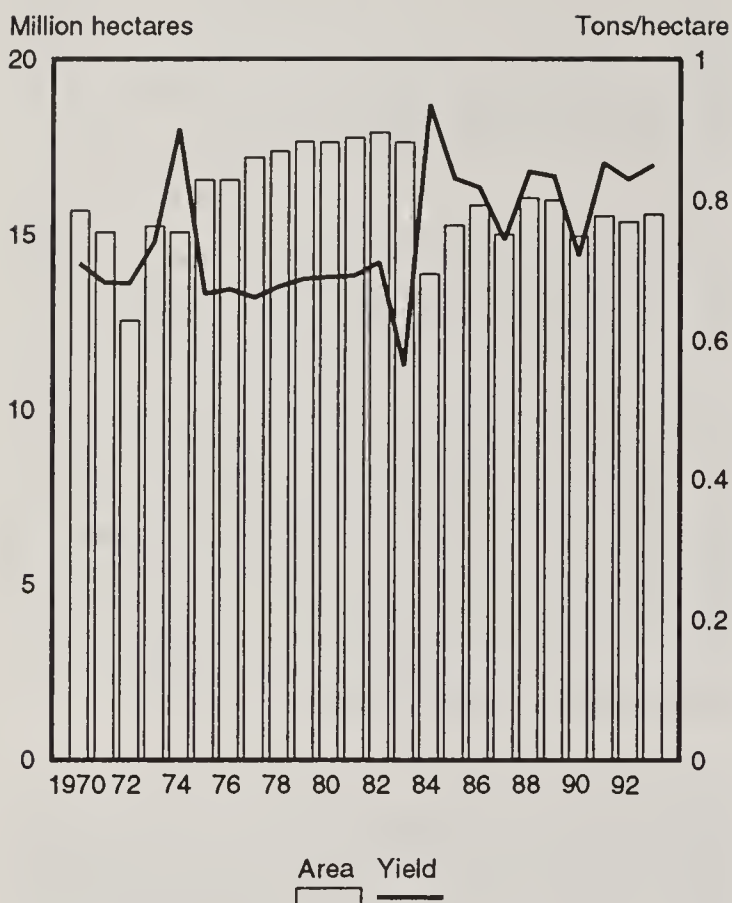
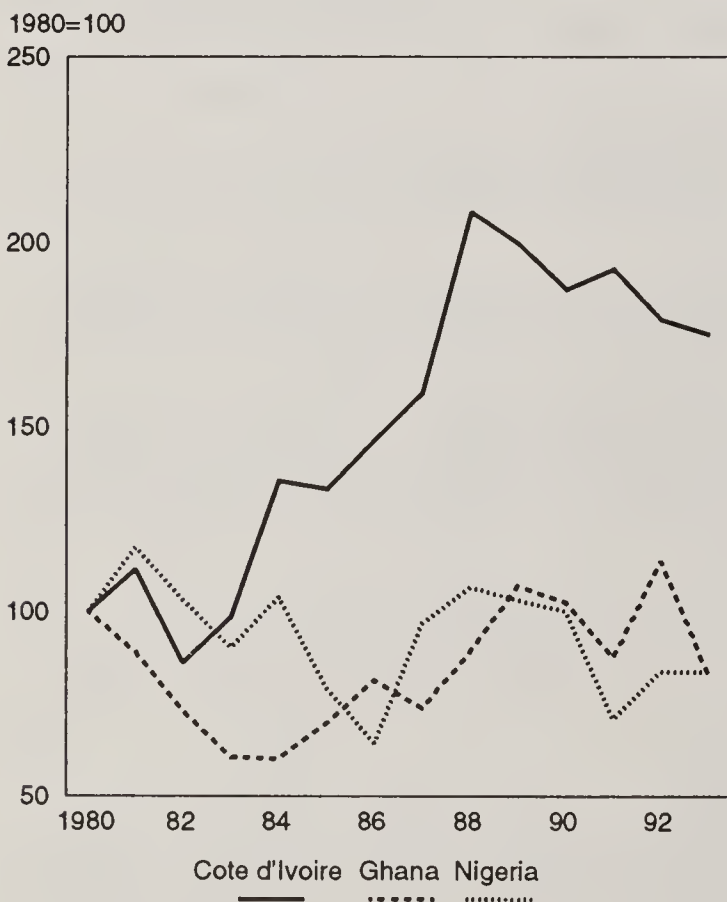
West Africa: Grain Area and Yield

Figure 7

Cocoa Production in West Africa

of development, and policies. Nigeria dominates the region by its population and land area. Ghana and Cote d'Ivoire are second and third in terms of population. All countries in this region have access to the sea and have traditionally had export-oriented economies based on a few commodities. The main export commodities are coffee, cocoa, and cotton. Rice and corn are the most important traded foods produced in the region. Annual grain production growth measured less than 1 percent during 1980-93 as a decline in area offset yield gains (8).

Cote d'Ivoire

In Cote d'Ivoire agricultural performance in the last decade was influenced by three major constraints: 1) the severity and recurrence of external shocks, as evidenced by the decline in the terms of trade, in part due to high export concentration in cocoa and coffee, 2) the persistence and rigidities of distortions, particularly the exchange rate, and 3) the reluctance of the government to revise its policies in the face of a rapidly changing economic environment (9). Per capita agricultural production fell 0.7 percent per year during 1980-93 (8).

Grain output increased 3.4 percent per year from 1980 to 1993. The market for rice, the most important grain, is controlled by the government. This includes marketing, importing, and maintaining strategic stocks. The marketing board collects and distributes only about 20 percent of domestic output at a fixed producer price (about 30 percent higher than the border price).

The export crop market is also regulated by the government. Traditionally, the government taxed export crop producers as prices were set below the world level. With declining world prices for commodities such as coffee and cocoa, the government has reduced producer taxes and is attempting to provide correct incentive signals to farmers. In 1989, a major structural reform program was introduced to improve the allocation of resources and increase the competitiveness of exports. In revising the pricing system, prices were linked to the quality of products. This is particularly important for coffee, as Cote d'Ivoire produces the lower quality robusta variety. The government reduced producer prices by 50 percent during 1988-1990 and the price support for substandard coffee was withdrawn for the 1990/91 season. Cote d'Ivoire's coffee production and exports declined during 1980-93.

As with coffee, producer prices for cocoa were reduced 50 percent during 1988-90. Production, however, continues to increase as production costs for cocoa are lower than those for coffee. Cote d'Ivoire has a comparative advantage in cocoa production and the quality of the crop is good by world standards.

Ghana

Ghana is consistently cited by the World Bank as a "model" country of policy reform. In 1983, the government adopted extensive macroeconomic policy reforms. Specific agricultural policy reforms were implemented in the late 1980's and focused on the gradual removal of government intervention. Per capita agricultural production has begun to rise. Ghanaian agriculture continues to operate at a very low level of tech-

nology. Without a significant improvement in agricultural performance, there is little prospect for achieving sustainable economic growth in the whole economy.

Traded crops such as cocoa will definitely respond to incentive signals. Ghana's cocoa market is not liberalized, but the government-set prices were increased along with the exchange rate adjustment. Prices were increased by 20 percent in real terms and cocoa production increased by 30 percent from 1981 to 1991 (1). However, cocoa prices remain significantly below the world market price. The government goal is to increase the price to 55 percent of the world level. Earnings from cocoa exports remain a major source of government revenue.

Nigeria

Nigeria's performance overwhelms the region as it accounts for more than 40 percent of West Africa's total agricultural production. Production declined 0.4 percent per year since 1980 due to a decline in area planted (8). The importance of the agricultural sector in the economy declined with the sudden increase in export revenue from oil in 1974 and again in 1979. When the oil price declined in the following years, the economic situation deteriorated. To reverse this situation, the government initiated policy reforms in 1986 to improve production incentives.

The principal goals of the policy reforms were to rapidly increase food production, thereby reducing food imports, and to raise incomes by increasing the output of traditional export crops. Measures taken to achieve these goals included devaluing the exchange rate, abolishing marketing boards, increasing the availability of fertilizer and credit, and banning imports of wheat, rice, vegetable oil, poultry meat, and animal feed. The import ban fueled sharp price increases for both imported and non-traded commodities such as cassava and sorghum (2). To dampen the price rise, the government issued some waivers for vegetable oil imports and lifted the wheat import ban at the end of 1992 (7).

The agricultural production response to these policy changes has been mixed. Output of wheat and rice has increased since 1986. Corn and sorghum production declined relative to 1980, but has increased since the implementation of policy reforms. It is difficult to conclude that this is a sustainable growth path. Domestic prices for most food commodities are kept artificially high due to the ban on imports. Even prices for commodities such as rice, which is smuggled from neighboring countries, remain significantly higher than world prices. The effect of government intervention on producers is measured by calculating producer subsidy equivalents (PSE's). In Nigeria, producer subsidies have increased since 1986 as price distortions caused by the import ban have more than offset the negative effects of currency overvaluation. For wheat, rice, corn, sorghum, and cotton lint, producer subsidies amounted to 74 percent of the value of production, compared with 31 percent in 1985 (table 3).

The government has also continued its fertilizer subsidy policy. Although the domestic price was doubled in 1993 to 80 naira per 50-kilogram bag of urea, it remains below the cost

of imports and domestic production. This policy, however, has been of limited benefit to farmers. It is estimated that half of the fertilizer is smuggled to neighboring countries or sold in the open market for three to four times the official price.

The recent switch in the government's exchange rate policy is expected to change cash crop production incentives dramatically. In January 1994, after 7 years, the free foreign exchange market was replaced by a fixed market and the currency was set at 22 naira to the U.S. dollar. At the time, the free market price was about 48 naira to the dollar. The policy had a dramatic and immediate impact on cash crop producers: In less than a day the farmgate prices for cocoa dropped from 55,000 naira per ton to 23,000, because exporters were getting only half as many naira for each dollar (7). In the short term, this is expected to reduce cash crop output.

The Sahel

The Sahel extends along the southern edge of the Sahara desert and includes the countries of Burkina Faso, Cape Verde, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, and Senegal. Agricultural production is characterized by low yields, even by African standards. Grains occupy roughly 70 percent of cultivated area. The principal food crops are millet and sorghum. Growth in grain production was nearly 3 percent during 1980-93 (8). The high-growth countries in this region include Burkina and Mali, where output expanded more than 5 percent per year. Production variation averaged 8.4 percent while shortfalls from trend averaged 3 percent. Both measures are higher than the Sub-Saharan average. In the 1990's, the Sahel has avoided the devastating droughts that plagued the region in the early 1970's and 1980's.

In the Sahel, production of export crops, more than food crops, is influenced by government policies and price factors, both of which vary by country. The region's major export crops are peanuts and cotton. The region's food sector has historically received little government attention. However, since

Table 4--Sahel: Index of production

Country/variable	1985	1990	1991	1992	1993
1979-81=100					
Burkina:					
Total agriculture	132.3	150.1	184.6	188.3	186.0
Per cap. agriculture	116.8	116.1	138.9	137.7	132.2
Total food	131.1	146.2	182.5	186.2	184.2
Per capita food	115.8	113.1	137.3	136.2	131.0
Mali:					
Total agriculture	108.7	125.2	137.5	135.8	140.9
Per cap. agriculture	94.4	93.4	99.4	95.1	95.6
Total food	108.4	121.5	132.8	131.1	134.6
Per capita food	94.1	90.7	96.0	91.8	91.3
Niger:					
Total agriculture	81.2	106.9	123.0	125.4	127.1
Per cap. agriculture	68.6	77.2	86.0	84.9	83.3
Total food	81.1	106.9	123.0	125.4	127.1
Per capita food	68.5	77.2	86.0	84.9	83.2
Senegal:					
Total agriculture	125.4	135.5	137.5	130.5	139.5
Per cap. agriculture	109.3	102.8	101.5	93.7	97.6
Total food	125.8	135.0	136.7	129.8	138.8
Per capita food	109.6	102.4	100.9	93.2	97.1

Source: (3).

Figure 8

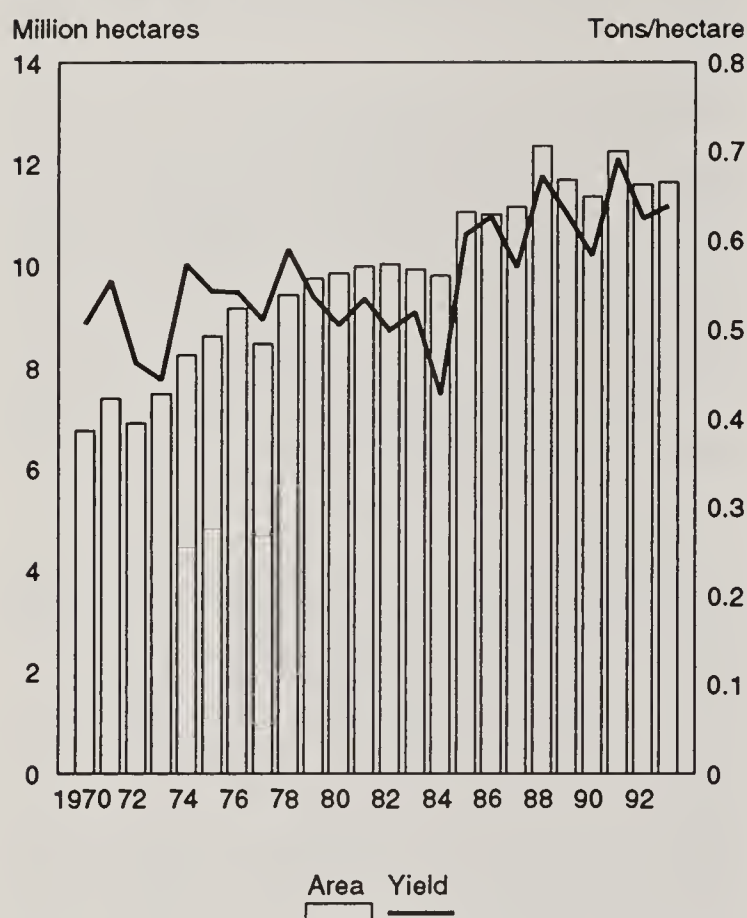
Sahel: Grain Area and Yield

Table 5--Senegal: Producer Subsidy Equivalents

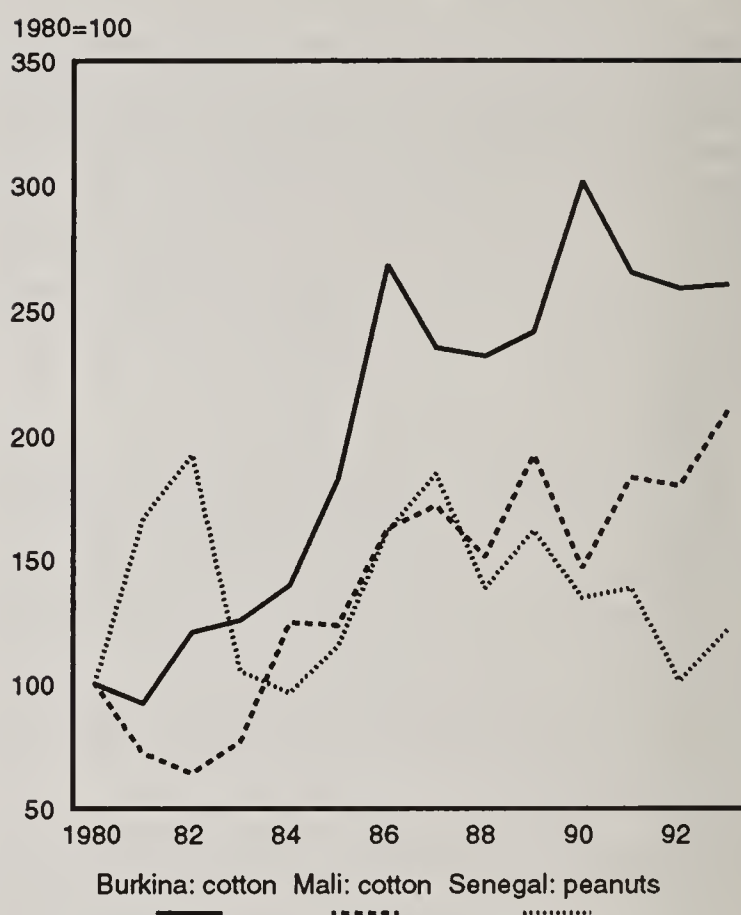
	1982	1985	1990	1991	1992
	Percent				
Senegal:					
Sorghum	24	28	61	56	61
Rice	45	86	105	101	100
Peanuts	2	-35	-2	42	30
Total	13	20	57	60	62

the mid-1980's, governments have reformed policies to enhance production incentives and reduce their role in the marketing process.

Burkina Faso

While good weather was the principal cause of Burkina's success in grain output during the last decade, government policies were influential in the production of cotton, Burkina's major cash crop. Policies are aimed at improving cotton producers' incentives and making cotton exports more competitive in the world market. The decline in world cotton prices since 1990, however, has reduced returns in the early 1990's. Cotton prices have strengthened in recent months and the CFA franc devaluation will make West Africa's cotton exports more competitive (10).

Figure 9

Cash Crop Production in the Sahel**Mali**

Agricultural output in Mali has come close to keeping up with population growth (table 4). Grain production grew 5 percent, while cotton production grew about 10 percent per year during 1980-93 (3). Mali exports all of its domestic cotton production. As a part of overall structural adjustment policies, Mali's cotton sector was restructured in 1989. Producer prices were revised in light of changing export prices and a stabilization fund was established to dampen the effect of short-term world price fluctuations on domestic producers (1).

Niger

Government policy in Niger has focused on diversification of production with a view to achieving self-sufficiency in food. An early warning system has been put in place to report on the cycle of the rainy season for production planning and early detection of drought. The abolition of fixed market prices for millet and sorghum in 1986/87 and the increase in participation of the private sector in marketing resulted in increased production (1). The production gain stemmed from an increase in area cultivated as yields declined on average.

Senegal

Senegal's grain markets have been partially liberalized. The government is committed to reducing import dependency and supporting domestic producers. Producer and retail prices for rice, the most traded staple commodity, are controlled by the government. Producer prices for rice increased during the

1980's despite a decline in the world price. The increase outweighed the elimination of the input subsidy. The share of the subsidy in the total value of rice production increased from 45 percent in 1982 to 100 percent in 1992. Producer prices for millet and sorghum, which were fixed by the government until 1989, have been liberalized.

In Senegal, government intervention in the peanut market continues, and peanut production has stagnated since 1980. Producer prices are still set by the government to stabilize the incomes of peanut farmers. In 1991 and 1992 producer prices were set higher than falling international prices, thereby resulting in a subsidy to producers (5).

Central Africa

Despite being well endowed with natural resources, Central Africa's growth in agricultural production has been slow and has even declined in some countries. Roots and tubers are the main staples produced in the region (Cameroon, Central Africa Republic, Congo, Gabon, and Zaïre), followed by grains (corn, sorghum, and millet). Trade in roots and tubers is limited and most production is for home consumption. Grains are produced by both commercial and subsistence farmers. Grain production has expanded less than 2 percent annually since 1980 (8).

Cameroon

Agricultural growth in Cameroon, the second largest country in the Central region, exceeded population growth until 1987,

but since then has fallen short. The decline resulted from weak export crop production due to unfavorable world commodity prices and domestic policies. The main cash crops are coffee and cocoa, while the main food crops are corn and cassava.

Production constraints are related to policy rather than resource availability. As in other countries in the region, government intervention in the agricultural sector was widespread until the late 1980's and implemented through a large number of institutions. The government set producer prices and regulated marketing activities. Export commodities were taxed and tariffs were imposed for substitute commodities. The government's price policy was focused more on export crops and except for rice and corn, food crops were not subject to price controls.

Table 6--Central Africa: Index of production

Country/variable	1985	1990	1991	1992	1993
1979-81=100					
Cameroon:					
Total agriculture	110.1	116.4	116.8	110.5	110.1
Per cap. agriculture	95.6	87.5	85.3	78.4	76.0
Total food	111.6	117.5	116.2	112.6	115.3
Per capita food	96.9	88.2	84.8	79.9	79.5
Zaire:					
Total agriculture	116.6	128.9	132.3	133.9	134.2
Per cap. agriculture	99.5	93.2	92.6	90.7	88.1
Total food	116.5	128.6	132.4	134.0	134.5
Per capita food	99.4	92.9	92.6	90.8	88.3

Source: (3).

Figure 10

Central Africa: Grain Area and Yield

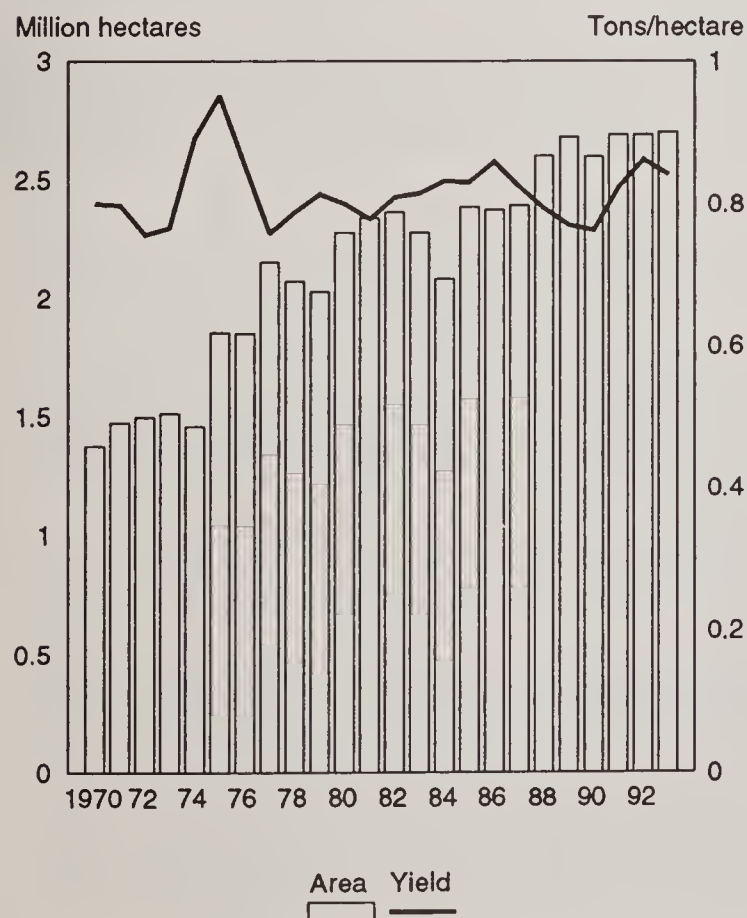
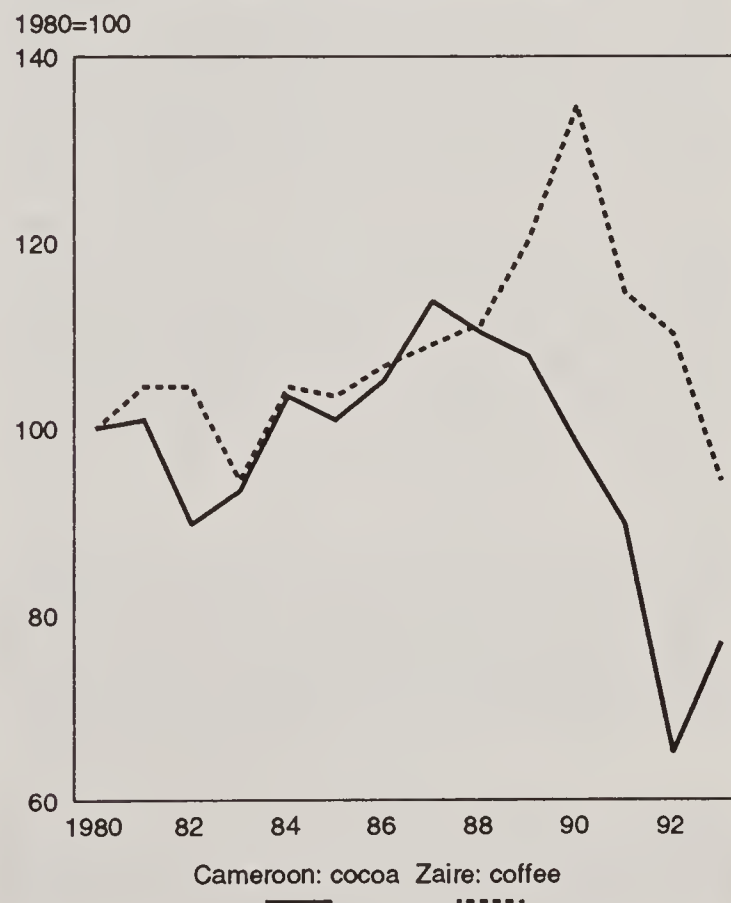


Figure 11

Cash Crop Production in Central Africa



For export commodities, the price policy objective was to reduce the risks associated with changing world prices. Therefore, in the case of a sudden increase in the world price producers were taxed, and when world prices declined producers were subsidized. The policy became very costly in the second half of 1980's when world prices for Cameroon's exports declined sharply. During this time the increased budget deficit finally forced the government to adopt major policy reforms. In 1989, prices for the major export commodities, cocoa and coffee, were reduced by more than 40 percent and export operations were privatized (1).

With the continued price decline in 1990/91, government prices for coffee and cocoa were adjusted further to reflect world market prices. Under the new system, producer prices will be based on the expected world market price minus marketing costs and taxes. Production of coffee and cocoa decreased by 18 and 13 percent during 1990/91 to 1992/93. The recent devaluation of the currency is expected to boost agricultural production, particularly for export crops, and reduce the financial burden of subsidizing food production.

The government continues to protect production of food crops by keeping producer prices above border prices. Price controls for rice and corn remain intact. This costly intervention has not been successful in increasing output. Growth in food crop production is due to area expansion, which has become more limited in the main food producing regions. Yield growth has been limited because of inadequate attention to methods of intensification and agricultural services to farmers.

Zaire

The Central African region is dominated by the performance of Zaire, where area harvested expanded rapidly through the 1970's, but has slowed since. Agriculture is the most important sector in the economy, providing direct and indirect employment to about 75 percent of the population. While Zaire has tremendous potential for agricultural growth with its rich natural resources, fertile soils, and ample rainfall, output is constrained by the current economic and political crisis. About 35 percent of the country's land is suitable for agriculture, but only 3 percent is cultivated and 1.5 percent is grazed. Most of the 3.5 million farmers are smallholders with one or two hectares. These farmers rely on family labor, few inputs, and simple tools. Not much of the output is marketed. Migration to urban areas, mostly by the male population, is on the rise. This implies labor shortages in the agricultural sector and greater demands on women in food production and marketing (1).

Zaire, a net food exporter in the early 1960's, imported about 20 percent of its grain consumption in 1990-93. The decline in food self-sufficiency is the result of poor macroeconomic policies, including price and marketing controls, and an overvalued exchange rate. Also, the market infrastructure has deteriorated because of a lack of investment and maintenance.

Government intervention in the agricultural sector remains strong. The liberalization measures adopted in 1983 and the subsequent devaluation of the currency were important steps in reversing the economic mismanagement. But soon after,

government intervention resumed and public expenditures grew, leading to high inflation. Public spending for agriculture, however, declined during the last decade. Agriculture's share of the total budget was only 2-3 percent during the second half of the 1980's.

The potential to increase agricultural productivity, both for domestic consumption and exports, is enormous. The outlook for short-term recovery of the agricultural sector, however, remains poor. The government of President Mobutu has been characterized by corruption and mismanagement. He continues to cling to power despite demands by the international community to relinquish his position. In 1990, the government suspended political and economic reforms. The income and living standards for the majority of the population continue to decline. Donors, however, are determined to reduce their aid unless a significant improvement is made in the government's economic management.

East Africa

Much of East Africa (Burundi, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, and Uganda) has good, productive soils. The climate is diverse, depending on the altitude. The higher altitudes receive adequate rainfall, while the Red Sea coast and the horn of Somalia are largely arid. The main food crops are corn, beans, and cassava, while the principal export crops are coffee and tea. Grain production, consistently lower than the annual population increase, equaled less than 2 percent per year since 1980 (8). This is due to very slow growth in yields. East Africa also suffers from high annual production variability, near 9 percent, well above the Sub-Saharan average. Shortfalls average about 3 percent. The major producers in the region are Ethiopia, Kenya, Sudan, and Tanzania.

Ethiopia

Ethiopia's output has shown some improvement in the 1990's due to area expansion. Area declined through the 1970's due to the civil war and has begun to rise only recently, but still

Table 7--East Africa: Index of production

Country/variable	1985	1990	1991	1992	1993
1979-81=100					
Ethiopia:					
Total agriculture	96.6	111.4	111.9	114.3	112.9
Per cap. agriculture	86.8	86.6	84.3	83.5	80.0
Total food	98.0	112.5	112.8	115.1	113.4
Per capita food	88.1	87.4	84.9	84.1	80.3
Kenya:					
Total agriculture	122.7	146.8	143.2	136.1	135.4
Per cap. agriculture	102.6	103.4	97.6	89.7	86.2
Total food	121.4	147.3	144.7	139.0	134.5
Per capita food	101.5	103.7	98.5	91.5	85.6
Sudan:					
Total agriculture	111.5	86.5	113.1	130.0	125.1
Per cap. agriculture	95.6	64.2	81.6	91.3	85.4
Total food	108.2	86.7	114.7	133.0	129.3
Per capita food	92.8	64.4	82.8	93.4	88.3
Tanzania:					
Total agriculture	110.5	124.8	122.5	118.1	121.6
Per cap. agriculture	93.8	89.2	84.6	78.9	78.5
Total food	113.4	127.0	123.1	119.0	122.9
Per capita food	96.2	90.8	85.0	79.4	79.3

Source: (3).

Figure 12

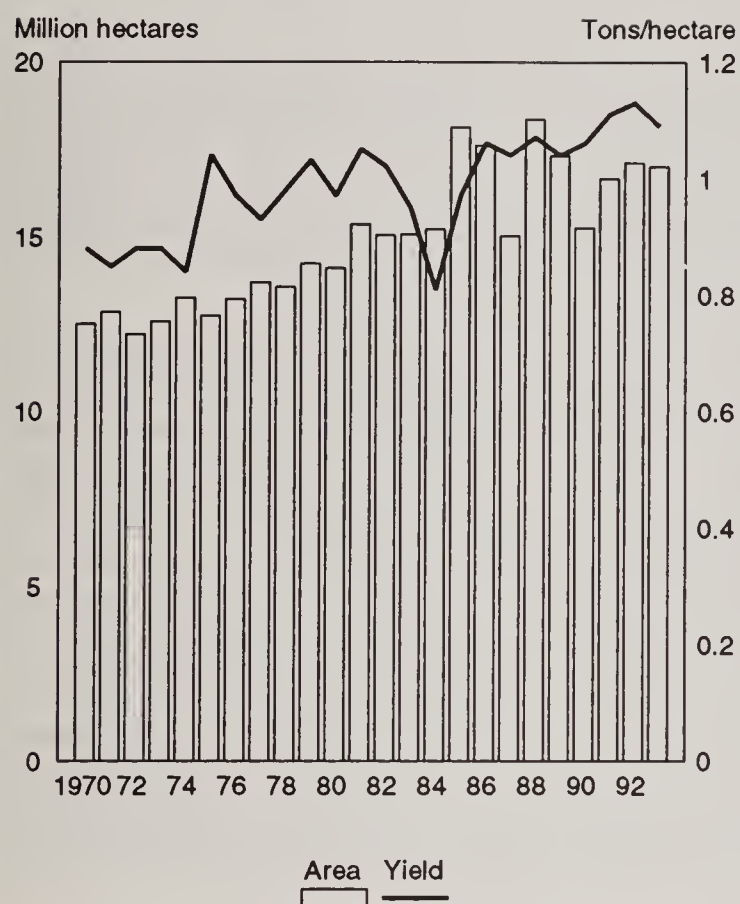
East Africa: Grain Area and Yield

Figure 13

Cash Crop Production in East Africa

1980=100

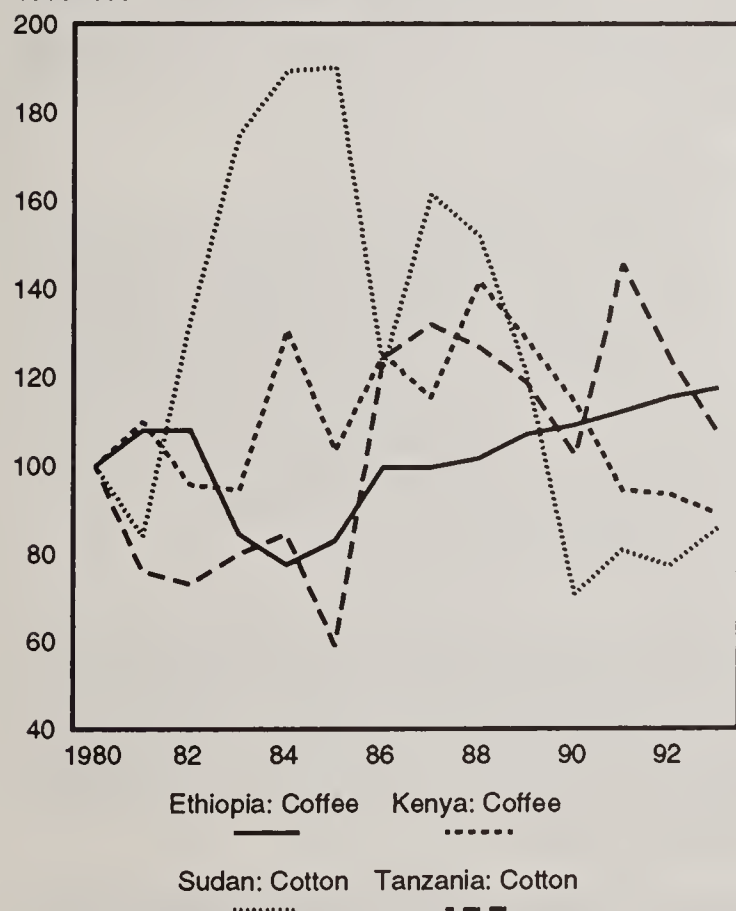


Table 8--Selected East African Producer Subsidy Equivalents

	1982	1985	1990	1991	1992
Percent					
Kenya:					
Wheat	-106	-9	17	15	22
Corn	-214	-45	-52	-29	64
Rice	-231	10	-150	-198	-73
Sugar	-272	35	-192	-144	-101
Coffee	-101	-65	-21	-57	-17
Tea	-115	-59	-58	-43	22
Total	-155	-47	-59	-49	28
Tanzania:					
Wheat	-324	6	0	78	68
Corn	-405	15	-164	25	29
Rice	-457	62	-98	75	103
Cotton	-528	45	-169	36	-7
Coffee	-1204	-345	-113	-26	-132
Total	-528	-5	-132	37	36

Source: (2).

has not matched earlier levels. Yields have remained virtually unchanged since 1980. Besides the war's end in May 1991, Ethiopia's upward trend in grain production can be attributed to market liberalization policies. Reforms implemented in the agricultural sector include: Guaranteeing land usership rights, eliminating restrictions on renting land and hiring labor, continuing the liberalization of pricing and marketing begun in 1990 by the former government, and improving farmers' access to inputs and extension services. Since April 1992, the government has allowed the private sector to market and distribute seeds and fertilizer. Despite this progress, Ethiopia's agricultural sector will always be vulnerable to drought. Production variation averaged 12 percent, while shortfalls averaged 4.2 percent during 1970-93.

Kenya

Kenya's grain output has stagnated since 1980 (8). Area has remained virtually unchanged and yields even fell slightly. Production variation averaged 14.6 percent, shortfalls 5.8 percent. Except for tea, where production doubled during the 1980's, production of export crops has followed the same pattern.

Kenya's greatest constraint to expanding agricultural production is a lack of arable land. Less than 20 percent of the total land area of 57 million hectares is considered to have medium-to-high potential. Of the remainder, about 60 percent is desert with limited potential even for livestock production (10).

Other than land limitations, agricultural growth has been hindered by inadequate producer incentives, limited use of inputs due to high costs, and insufficient credit availability. To stimulate production, government policies in the late 1980's were aimed at increasing fertilizer supplies, improving producer prices, and improving research and extension services. While these policies pointed Kenya in the right direction, implementation was often poor.

In 1990, fertilizer prices were decontrolled and in 1991 fertilizer imports were no longer subject to licensing. However, the continued domination of the fertilizer market by govern-

ment-owned distributors and the lack of foreign exchange have discouraged private traders.

Controls on grain trade have been relaxed. In February 1993, all restrictions on wheat marketing were removed. However, the National Cereals and Produce Board (NCPB) retains its authority to purchase wheat domestically or through imports to maintain a reserve. In November 1993, internal movement controls on corn were removed, and the private sector was authorized to import corn in response to food shortages. In December 1993, all price controls on corn and corn flour were removed. The NCPB's role ultimately will be limited to market stabilization and maintenance of the strategic grain reserve. In the near term, the NCPB will remain active in marketing the corn crop (7).

These changes are reflected in the producer subsidy equivalents that measure fertilizer, pricing, and foreign exchange policies for the major grains and cash crops. Combined, these policies taxed producers. However, the level of taxation declined over time (table 8). Taxes averaged 110 percent of producer revenue in 1982-84 and this declined to 30 percent in 1990-92. Producers were even subsidized in 1992 (2). Foreign exchange policy played the primary role in determining the level of producer subsidies and/or taxes. Overvaluation of the shilling has consistently taxed producers, but to a lesser extent, as the shilling has been devalued over the years.

Sudan

Sudan's grain production expanded 3 percent annually since 1980 (8). During this time, however, Sudan experienced three droughts that cut production from a third to a half of normal. Production variation averages nearly 32 percent and shortfalls average more than 11 percent. Sorghum accounts for roughly 75 percent of the grain grown in Sudan. While wheat output is small in comparison, it has nearly tripled since the late 1980's due principally to an increase in area planted. This reflects the government's policy of achieving food self-sufficiency. The expansion of wheat area came at the expense of cotton, Sudan's largest export earner. Cotton output is currently about half the peak level of the mid-1980's. Consequently, earnings from the crop have fallen 70 percent since the late 1980's.

Sudan's agricultural sector has been plagued by a civil war, ongoing since 1983, which has displaced nearly 4 million people. The war has diverted funds from agriculture to the military, disrupted marketing activities, resulted in extensive livestock losses, and destroyed infrastructure.

Tanzania

In years of favorable weather, Tanzania is self-sufficient in food. The country has varied ecological zones that allow for the production of several crops. During drought years, however, imports are necessary. The principal constraint to production is the inadequate road network, which results in harvest losses and higher priced commodities. Consequently, imported food is often cheaper in urban areas than domestically produced food. Cotton is the largest export earner, but is constrained by the country's low ginning capacity (equal

to about 40 percent of annual production). As a result, cotton stays in storage for long periods, delaying export earnings (7).

Production growth in Tanzania remains strong at nearly 3 percent annually since 1980, but has fallen from the longer term trend of more than 5 percent (8). This is due to a slowing of area planted. During 1970-85 grain area harvested doubled. Since then, the increase has been very slow. Like the other East African countries, Tanzania's agricultural production is highly variable, averaging 15 percent. Shortfalls averaged 6 percent.

The Tanzanian government introduced an Economic Recovery Program (ERP) in 1986 with the primary goals of reducing the overvaluation of the shilling and improving producer prices. As part of the ERP, in 1987 cooperatives were permitted to sell grains directly to private traders. In 1988, grain trade was fully liberalized and by the end of 1993 the private sector accounted for 90 percent of trade. In 1991, the minimum producer price was replaced by an indicative price used to guide farmers in negotiating sales. Producer prices are now determined by market conditions. The government intervenes only through the purchase, storage, and distribution of corn by the Strategic Grain Reserve. Input distribution was also deregulated. The greatest area for reform lies with eliminating remaining restrictions on the marketing of export crops. Domestic marketing is handled by cooperatives, while export marketing is handled by marketing boards (1,7).

Calculations of producer subsidy equivalents show that Tanzanian producers were taxed through the 1980's (table 8). These taxes averaged more than 300 percent of revenues in 1982-84. In 1991 and 1992, however, producers were subsidized at a rate of 37 percent of revenues. These subsidies were due to the sharp rise in producer prices for wheat and corn (2).

Southern Africa

Southern Africa is generally characterized by good agricultural conditions. The staple crop for nearly all countries in the sub-region (Angola, Botswana, Lesotho, Madagascar, Malawi, Mozambique, Swaziland, Zambia, and Zimbabwe) is corn. In Southern Africa (excluding South Africa), grain output growth has averaged less than 1 percent per year since 1980 due to slow growth in area and yields (8). Variation averaged 13.4 percent and shortfalls 4.4 percent. Major producers in the region are Angola, Madagascar, Mozambique, Zambia and Zimbabwe.

Angola

Angola is sparsely populated and well endowed with natural resources. Most of the country is situated in a fertile plateau with ample water supplies for agriculture. Despite these good resources, civil war and a lack of coherent economic policies distort resource allocation and hinder economic performance, including farm output.

After the 1991 peace agreement, grain production increased 50 percent in 1991/92 and 20 percent in 1992/93. Civil war

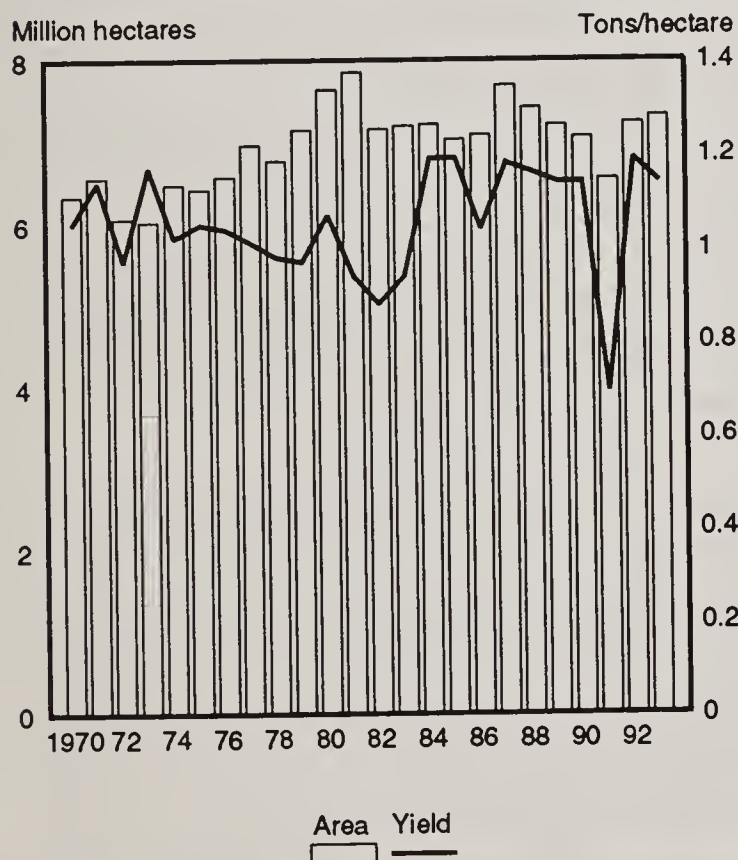
Table 9--Southern Africa: Index of production

Country/variable	1985	1990	1991	1992	1993
1979-81=100					
Angola:					
Total agriculture	98.2	99.6	102.4	104.3	96.8
Per cap. agriculture	86.1	75.7	75.1	73.8	65.9
Total food	100.7	103.3	106.1	108.2	100.3
Per capita food	88.3	78.5	77.8	76.5	68.2
Madagascar:					
Total agriculture	111.6	122.4	121.4	124.0	127.1
Per cap. agriculture	95.8	89.6	86.0	85.0	84.3
Total food	112.0	123.4	122.5	125.2	128.5
Per capita food	96.1	90.4	86.8	85.8	85.2
Mozambique:					
Total agriculture	100.6	108.8	101.7	84.1	93.9
Per cap. agriculture	89.8	92.6	84.8	68.4	74.1
Total food	103.4	110.3	103.2	86.4	96.8
Per capita food	92.3	94.0	86.1	70.2	76.4
Zambia:					
Total agriculture	110.7	129.4	136.1	117.3	156.6
Per cap. agriculture	92.6	91.2	93.1	78.0	101.2
Total food	110.1	128.3	133.3	116.9	153.2
Per capita food	92.1	90.5	91.2	77.7	99.0
Zimbabwe:					
Total agriculture	129.7	128.4	129.0	80.8	120.3
Per cap. agriculture	110.6	92.2	89.7	54.5	78.8
Total food	124.8	126.1	116.8	59.8	104.1
Per capita food	106.5	90.6	81.3	40.4	68.3
South Africa:					
Total agriculture	95.6	103.2	105.0	81.9	101.1
Per cap. agriculture	84.1	80.4	79.8	60.8	73.3
Total food	95.4	103.6	105.3	81.2	101.5
Per capita food	84.0	80.7	80.1	60.3	73.6

Source: (3).

Figure 14

Southern Africa: Grain Area and Yield



Excludes Republic of South Africa.

recommended in late 1992 and disrupted cropping activities in 1993/94.

Madagascar

Madagascar has historically not taken full advantage of its natural and human resources. The country's per capita income in 1991 was \$220. Its exceptional ecological and climatic diversity, however, will allow cultivation of different types of tropical and temperate crops. This agricultural potential, combined with mineral deposits, could provide a strong base for a diversified economy and export growth.

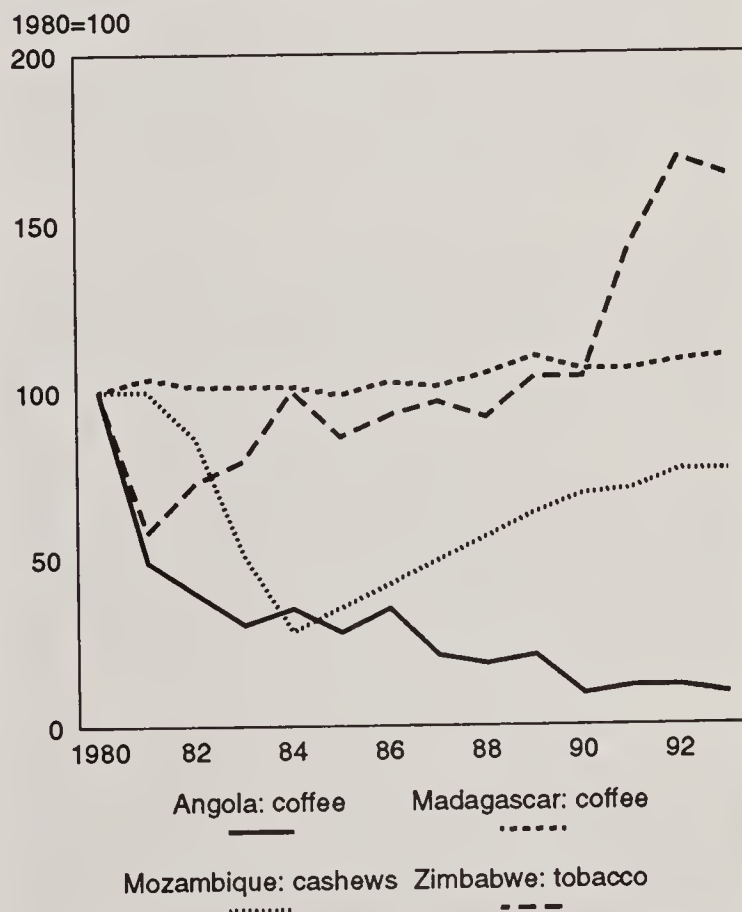
In Madagascar, total agricultural output increased 20 percent, while population growth was about 38 percent during 1980-91 (6). Widespread political unrest in 1991 severely disrupted economic activities. The economy is dominated by the agricultural sector.

Table 10--Zimbabwe: Producer Subsidy Equivalents

	1982	1985	1990	1991	1992
Percent					
Zimbabwe:					
Wheat	-83	-39	-62	-62	10
Corn	-97	-27	-60	-132	-31
Sorghum	-133	-74	-37	-56	-20
Cotton	-128	-79	-82	-78	-6
Total	-103	-41	-65	-103	-13

Figure 15

Cash Crop Production in Southern Africa



Rice comprises nearly all of Madagascar's grain output. The country's area and yields have remained virtually unchanged since 1980. Until 1982, a comprehensive system of price controls was maintained by the government. In 1982, all price controls were eliminated, starting with producer prices in 1983 and ending with retail prices in 1989. A large devaluation occurred in 1987. Despite policy reforms, increases in producer prices have been nearly outpaced by inflation, thereby reducing incentives to plant (1).

Production of coffee, historically the most important export crop, has generally remained stagnant since 1980. Production of vanilla, which since 1990 has been the leading export earner, increased during 1985-90 and declined during 1991-92. Bad weather and a decline in the real producer price of vanilla contributed to the drop. Trade in vanilla has been very profitable for the country because of the low production costs relative to export prices. In 1992 the export price was more than \$70 per kilogram, while the estimated domestic cost was less than \$15. However, Madagascar's market share in the world vanilla market has declined from 65 percent in the early 1980's to 40 percent in the early 1990's. Increased consumption of inexpensive synthetics and lower quality exports by the Asian countries contributed to the decline (1).

Mozambique

Mozambique, another war-torn country in the Southern region, is faced with rebuilding the agricultural sector after the 1993 peace accord. The 16-year civil war has severely disrupted the production and marketing systems, and caused large-scale population displacement. Massive destruction of infrastructure, lack of management, severe poverty, and underdeveloped human resources are so great that development will be lengthy and require extensive external assistance. Agricultural growth is slow and remains vulnerable to weather variability. In 1993, after recovering from the 1992 drought, the region's worst in a century, grain production returned to normal. The government plans to boost its exports of traditional crops such as cashews, tobacco, tea, sugar and cotton.

Zambia

In Zambia, agricultural production has failed to keep pace with population growth, as indicated by the 12-percent decline in per capita production during the 1980's (6). Zambian agriculture is dominated by corn production, which accounts for 70 percent of cultivated land and uses more than 80 percent of fertilizer. Wheat became increasingly important during the last decade, but output is still small, accounting for less than 5 percent of total grain production in 1990-93. Corn is produced in rainfed areas and is highly susceptible to drought, while wheat is produced in irrigated areas. The corn crop has been significantly reduced by drought four times since 1980 (1980, 1983, 1984, and 1992) (2).

Several interacting factors are responsible for Zambia's poor agricultural performance. Historically, the country's agricultural policies were designed to provide a stable, inexpensive supply of corn to urban areas. Corn was the focus of government policies. The corn market has been controlled since 1964 through fixed producer prices, input subsidies, and a government marketing monopoly (7). Despite a policy reform

program begun in 1982, taxes on producers increased through the 1980's because of low producer prices (2). However, since 1991, the government has accomplished an extraordinary turnaround in economic policy.

The government's role in agriculture has been reduced. The government now sets a floor price for corn producers and acts as a buyer of last resort. The government's commitment to policy reform did not wane during the 1992 drought when the corn crop fell to a third of domestic needs (10). In 1993, however, while corn production recovered, the marketing exercise was marred by conflicting signals from the government concerning its role. The rise in real interest rates, the fall in the regional corn price, and high transportation costs deterred the private sector from marketing corn. In 1993, when it became clear that the private sector would be unable to purchase and transport all of the available surplus corn, the government resumed its marketing role. The government's challenge is to increase private sector participation in agricultural marketing by improving market infrastructure.

Zimbabwe

Agriculture is not the dominant economic sector in Zimbabwe, unlike most Sub-Saharan countries. Agriculture's share of GDP was 20 percent in 1991. Zimbabwe's agricultural performance was viewed as one of the success stories in Sub-Saharan Africa in the early 1980's. Since then, output has grown slowly, and less than the estimated 3 percent annual increase in population (6). Frequent drought (four times since 1980) and rigid policies have contributed to the slow growth in output. Total grain production has declined 1 percent per year since 1980. The 1992/93 drought reduced grain output 60 percent from the previous year (8).

Through the 1980's, nearly all of Zimbabwe's agricultural pricing and marketing systems were government controlled. The interventionist measures taxed producers and hindered output. In 1991, the government began to remove marketing restrictions and allow for greater flexibility in the pricing system. As a result, producer taxes (as measured by the PSE's) fell markedly (table 8) (2). The new pricing policy permits commodity marketing boards to compete with private traders and to vary prices depending on the production situation. The government continues to set floor prices for staple commodities such as corn. However, the marketing boards can offer higher prices to producers than the government-set floor prices to protect incentives for production.

Minimum producer prices for most crops have been raised in recent years, reducing the tax effect on producers. The price of corn, the most important food crop, is set in line with corn prices in neighboring countries and other prices are set at export parity levels to increase export potential. Private traders continue to be licensed by the marketing boards but nearly all restrictions on interregional transportation and trading of agricultural commodities have been removed. The devaluation of the currency also increased producers' incentives, particularly for the traded commodities (1).

Production of tobacco, Zimbabwe's most important export crop, rebounded from the 1992/93 drought to a record of more

than 200,000 tons. Although no production controls have been instituted, growers have been advised to reduce production (to about 150,000 tons) in 1994 because of poor international sales prospects (1).

Zimbabwe's good resource base has the potential to support extensive growth in the agricultural sector. The recent progress in market liberalization is expected to improve the allocation of resources, while limiting excess production and stockbuilding.

South Africa

South Africa's agricultural sector is made up of two distinct groups. A small number of white farmers represent a large, productive, and diversified commercial subsector that controls most of the land. A large number of black smallholders represent a subsistence subsector that has few resources. The total area under commercial agriculture is about 5 times that

of the subsistence sector, with more than 10 times the gross production value.

The production performance of South Africa's rainfed agriculture is highly variable. Between 1970 and 1993, average variation of grain production from trend was 25 percent. A severe drought in 1992 reduced cereal output 60 percent. Production returned to normal with average rainfall in 1993. Grain production, however, has been declining since the early 1980's, reflecting lower government subsidies.

The primary objective of government policies in the commercial sector is stabilizing producer prices. Production that exceeds domestic needs is exported with subsidies that depend on the world price and domestic price support levels. The long-term goal for rural black farmers is food self-sufficiency, which is important to the subsistence sector but has little significance for the commercial sector with its long history of exporting to international markets. In recent years, the government has moved the agricultural sector towards free-market determination and privatization of resources. Subsidies serve more to stabilize farmers' incomes than to encourage increased output and export market share.

Corn and winter cereals (mostly wheat) are marketed through a marketing board within a fixed-price scheme. Producer prices are fixed before planting. Before 1988, the price was often set above the market equilibrium price. The excess production was purchased at the fixed price and exported at world prices. The government paid the costs of the export subsidies, while domestic consumers paid higher than market equilibrium prices for both food and feed grains. Since 1988, export subsidies have come largely from a stabilization fund financed by a levy on producers. Now, producer prices are set on a sliding scale with a lower price received for a larger crop.

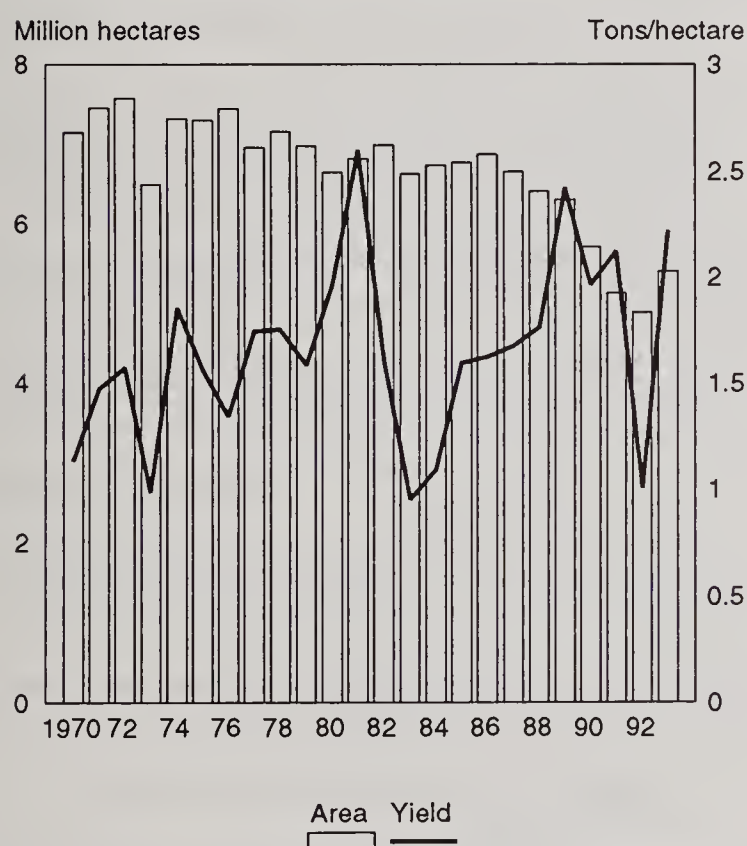
Producer subsidies for corn reached 37 percent of producer revenue in 1987 (table 11). Following a change in government policies, producer subsidies declined and producers were taxed, on average, until 1992. The same pattern also applied to wheat producers, except they received small subsidies in both 1990 and 1991. These results reflect the government policy of stabilizing producer prices in the face of world price fluctuations. The drought in 1992 put policy reforms on hold, and corn and wheat producers received large subsidies to encourage marketing of their much smaller crops. These subsidies were largely eliminated in 1993.

South Africa is one of the few countries in the region that is a net agricultural exporter in most years. Agricultural exports represent about 40 percent of agricultural gross national product (GNP). The main exports are corn, wool, sugar, and fresh fruit. Rice, wheat, vegetable oils, and livestock products are the principal imports. The government has few direct restraints on agricultural imports but promotes exports of surplus production.

Currently there is a great deal of uncertainty about agricultural policies due to the recent elections. The new government is expected to favor consumers and to place greater emphasis on the smallholder subsistence sector as subsidies to com-

Figure 16

South Africa: Grain Area and Yield



1993 corresponds to the Northern Hemisphere's 1992/93 marketing year.

Table 11--South Africa: Producer Subsidy Equivalents

	1982	1985	1990	1991	1992
	Percent				
Wheat	14	-25	15	3	48
Corn	-10	-8	1	-18	99
Sugar	29	38	-54	-14	5
Total	5	-3	-7	-12	60

Source: (2).

mercial farmers are substantially reduced. The Land and Agricultural Policy Center, which is affiliated with the African National Congress, has called for an end to agricultural marketing boards and the liberalization of trade in food products. The center has also called for the elimination of all marketing restrictions and controls on agricultural products, except for phytosanitary restrictions. Land reform and redistribution are also expected to be high on the new government's policy agenda, but no consensus has yet emerged on the implementation of a reform program.

South Africa is in a position to benefit from the liberalization of trade that will take place under the new General Agreement on Tariffs and Trade (GATT) agreement signed in April 1994. Conversion of import licenses to tariffs will affect most agricultural imports, including corn, wheat, poultry, and milk, beginning in 1995/96. The implications of such a change are many and include the opening of the domestic agricultural market to increased competition, the increased influence of world prices, and changes in the marketing systems.

Production Outlook

Agriculture remains the region's most important sector. Continuation of the historical agricultural production growth rate of 2.5 percent per year will mean a significant decline on a per capita basis. The Food and Agriculture Organization (FAO) projects, more optimistically, that agricultural production in Sub-Saharan Africa will increase 3 percent annually, thus translating into a slight decline on a per capita basis in the next two decades (4).

In some countries, gains in production will largely be due to area expansion. However, in many countries population pressures and poor farming practices that have caused soil erosion and nutrient-deficient soils have already pushed farmers to marginal lands. Therefore, the only option for sustainable production growth is to increase yields. Adoption of high-yielding corn varieties in Kenya and Zimbabwe was a milestone in increasing yields in the region during the last two decades. Improved production practices such as mixed cropping, which is currently used extensively, can be used to further increase yields. The gains from improved farming practices are very important, but are not expected to substantially increase total production.

Irrigation can increase agricultural output as well as reduce production variability, but the amount of irrigated land in Sub-Saharan Africa is small. Many of the larger scale irrigation schemes were developed to increase production of cash crops. Yields in the irrigated areas are not significantly above those in rainfed areas because of the lack of inputs, poor water control, and lack of maintenance. There is potential for expanding irrigated area, but the required investment is costly.

Access to markets has been a significant constraint for small scale Sub-Saharan farmers. Rural infrastructure development

is needed to facilitate transportation, distribution of seeds, tools, and inputs, and the marketing of output. Improvements in market infrastructure, however, require investment and the likelihood of a significant increase in investment in these countries is slim. According to the World Bank, domestic savings in countries successfully implementing adjustment policies did not increase markedly and prospects for further increases are not encouraging.

The last, but not least, avenue to reverse the region's declining production trends is to continue implementing policies to improve production incentives and reduce economic inefficiencies. The most recent World Bank publication evaluating structural adjustment policies in the region provides a sketchy picture of achievements so far, and dampens expectations for a quick fix. The report has attempted to link the achievements of the countries to their policies, but some of the connections remain weak (9). Part of the reason for this may be the short time policies have been in place. In addition, it appears exogenous factors, particularly weather, continue to play a major role in influencing agricultural trends in the countries.

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Productivity in African Agriculture: Sources of Growth and Stagnation

Traditional inputs (land, labor, livestock) were the dominant source of output growth in Sub-Saharan Africa. Agricultural research had a modest impact. Agricultural export growth and historic calorie availability had a positive impact on productivity, while increases in export instability had a negative impact. These results suggest a strong positive relationship between trade performance and food security on one hand and agricultural productivity on the other. [Kevin Ingram and George Frisvold]

Introduction

Sub-Saharan Africa's agricultural productivity has been stagnant and in the last 30 years, land and labor productivity have declined in many Sub-Saharan countries.

Statistical analysis allows us to estimate the impact of a change in input use (such as fertilizer) on agricultural output and to estimate the relative contribution of changes in different factors on the growth of agricultural output.

Classification of Countries

Table 12 lists the countries examined, classified into four agro-climatic zones: 1) the sub-humid tropics, where the growing season ranges from 150 to 210 days, cropping patterns are heavily dependent on altitude and the major crop is corn; 2) the humid tropics, where the growing season increases from north to south in West Africa and the major crops are roots and tubers; 3) the semi-arid tropics, where the growing season ranges from 75 to 150 days and the major crops are millet, sorghum, and peanuts; and 4) the lowland humid tropics, where the growing season ranges from 180 to 365 days and major crops are rice, sugar, roots and tubers (13).

Sources of Growth

The sources of agricultural growth can be broken down into conventional and nonconventional inputs (7). Conventional inputs include land, labor, fertilizer, or other standard production inputs. Nonconventional inputs capture effects of macroeconomic factors or agro-climatic conditions that are not traditional choice variables in farmers' production deci-

sions. They also include factors such as agricultural research knowledge or irrigation works that are supplied through public investments.

The five conventional inputs included in this analysis were labor, land, fertilizers, tractors, and livestock. The nonconventional inputs considered were:

Irrigation

The level of irrigation technology and infrastructure is measured by the percent of agricultural cropland that is irrigated.

Historic calorie availability

A number of household-level studies have found that agricultural labor productivity improves with historic nutrient intake of laborers. Changes in calorie availability appear to have important productivity effects in Sub-Saharan Africa, where 26 percent of the population is deficient in calories for maintenance and 44 percent are deficient in calories for work (8).

The historic average of calorie availability relative to calorie requirements was considered rather than current calorie availability. Historic calorie availability is a better measure of the long-term health impacts of nutrition.

Calorie availability may also be thought of as a measure of food security, albeit a relatively crude one. The variable says nothing about the distribution of food availability within a country. However, it is reasonable to expect that as aggregate food availability declines, chronic food insecurity increases. Chronic food insecurity represents a country's longer-term difficulties in meeting basic nutritional requirements.

Food insecurity may adversely affect agricultural productivity for another reason. In areas of chronic insecurity, agricultural producers are likely to adopt risk-reducing rather than yield-increasing production strategies (14,15).

Agricultural export growth

Export development is believed to stimulate productivity growth in a number of ways. First, countries benefit from basic comparative advantages and more rapid learning-by-doing from specialization. Second, expansion into international markets allows the export sector to benefit from scale economies. Third, the pressures of international competition are thought to force countries to more quickly adopt modern

Table 12--Study countries by agro-ecological zone

Humid tropics	Semi-arid tropics
Benin	Botswana
Burundi	Burkina Faso
Cameroon	Chad
Congo	Ethiopia
Cote d'Ivoire	Mali
Ghana	Mauritania
Liberia	Niger
Nigeria	Senegal
Rwanda	Somalia
Sierra Leone	Sudan
Togo	
Sub-humid tropics	Lowland humid tropics
Kenya	Madagascar
Malawi	Mauritius
Tanzania	
Zambia	
Zimbabwe	

technologies and efficient methods of production. Fourth, exports form an important source of foreign exchange necessary for importation of modern inputs and capital formation. Finally, export levies are an important source of government revenues in many Sub-Saharan countries. Changes in export earnings, therefore, affect the level of public funds available to finance irrigation projects, road construction, and other productivity-enhancing investments.

Growth of agricultural export earnings is likely to have a "demand-pull" effect on technological innovation in the agricultural export sector.

Agricultural export instability

While agricultural export growth is hypothesized to have a positive impact on productivity, we hypothesize that agricultural export instability is likely to have a negative impact for the following reasons. First, large fluctuations in international prices of agricultural commodities will likely discourage technological innovation by risk-averse farmers. Second, fluctuations in foreign exchange may adversely affect the timing and availability of modern imported inputs (11). Finally, fluctuations in foreign exchange may also reduce the efficiency of public investments to raise agricultural productivity (12). Development projects may proceed in an erratic and halting manner. Export instability was measured as the fluctuations around historic trends in agricultural exports.

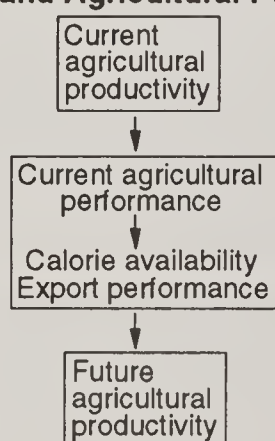
Historic calorie availability and the export growth and instability variables may be thought of as measures of past agricultural performance. Figure 17 shows the long-run relationship between agricultural productivity and performance. Current productivity has more immediate effects on current food security and export performance. In the longer run, we hypothesize that food security and export performance affect future productivity.

Agricultural research

An agricultural research intensity index was calculated as the research stock per hectare of agricultural land.

Figure 17

Long-run Relationship Between Agricultural Productivity and Agricultural Performance



Determinants of Land Productivity

Table 13 shows the elasticity of land productivity with respect to changes in each of the conventional and nonconventional inputs. Land productivity is measured as agricultural output per acre of agricultural land. An elasticity measures the percentage change of a variable of interest (in this case, land productivity) in response to a 1-percent change in other variables (conventional and nonconventional inputs).

A 1-percent increase in labor intensity leads to a 0.7-percent increase in land productivity. The responsiveness of productivity to labor intensity is very high relative to that of other conventional inputs. The responsiveness of productivity to traditional inputs, labor and livestock, is higher than those of "modern" inputs, fertilizers and tractors.

A 1-percent increase in the index of historic calorie availability leads to a 0.5-percent increase in land productivity. This is consistent with results obtained in other studies that found a strong responsiveness of economic growth to improvements in nutrition (2,5).

Past trade patterns were also found to be important determinants of longer-term technical progress. Both agricultural export growth and earnings instability significantly affected agricultural output. Growth had a strong positive impact while the impact of instability was negative.

These results suggest that trade liberalization can affect Sub-Saharan agricultural productivity through (at least) three channels: export growth, export instability, and food security. Agricultural trade liberalization effects are potentially favorable for countries relying on tropical crop exports (14,16). Results from one study suggest that removal of the EU's Common Agricultural Policy would reduce world grain price instability (1). However, it is uncertain what liberalization might do to the stability of Sub-Saharan export earnings. Liberalization could also have potentially negative effects on the food security of Sub-Saharan countries. Simulation studies suggest that liberalization of agricultural trade by OECD countries would reduce the food security of Sub-Saharan countries that are dependent on food imports (3,14).

Statistical analysis suggested that the elasticity of land productivity with respect to irrigation increases as irrigation intensity increases. Given the low irrigation intensity in Sub-Saharan Africa, this is not surprising. The elasticity of land productivity with respect to irrigation ranges from zero to as high as 0.45 in areas with substantial rice production (i.e. Madagascar). The elasticity is less than 0.02 for over half the observations, however. This indicates that irrigation has yet to have a substantial impact on production in Sub-Saharan Africa.

Statistical analysis also suggested that the impact of agricultural research on land productivity varied over agro-climatic zones. The elasticity of land productivity with respect to research is highest in the lowland humid tropics (0.6), lower in the semi-arid and humid tropics (0.12 and 0.16), and lowest in the sub-humid tropics (0.03).

Accounting for Agricultural Growth

Output growth depends on expansion of agricultural land and an increase in output per acre. Output per acre (land productivity) can be expressed as a weighted sum of growth rates in conventional and nonconventional inputs. The weights are simply the output elasticities from table 13.

Figure 18 shows the relative contribution of changes in different factors to agricultural output growth for the four agro-

Table 13--Effects of changes in conventional and nonconventional inputs on land productivity

Effect on land productivity of 1-percent increase in	Change in land productivity
Input	Percent
Labor/agricultural land	0.74
Livestock/agricultural land	0.14
Fertilizers/cropland	0.07
Tractors/cropland	0.06
Export growth (percent)	0.09
Export instability index	-0.07
Calorie availability index	0.55
Percent of cropland irrigated	
Minimum	0.00
Median	0.02
Maximum	0.45
Agricultural research	
Semi-arid tropics	0.12
Sub-humid tropics	0.03
Humid tropics	0.16
Lowland humid tropics	0.63

climatic zones between 1973-75 and 1983-85. Output growth is broken down into contributions by traditional inputs (land, labor intensity, livestock intensity), modern inputs (intensity of fertilizers, tractors, and irrigation), trade performance (agricultural export growth and export instability), and other variables.

Output growth over this period ranged from 1.1 to 1.8 percent and came predominantly from land productivity growth. Land expansion accounted for only about a 0.1-percent increase in output per year across all regions except the humid tropics. In this region land expansion was a relatively more important source of growth, contributing to a 0.3-percent increase in output per year on average. Land expansion was particularly important in Burundi, Cameroon, Cote d'Ivoire, and Sierra Leone.

The figure illustrates that the primary source of output growth in Sub-Saharan Africa remains growth in traditional inputs. The exception to this was the lowland humid tropics, where increased irrigation (for rice cultivation) was an important source of growth. Modern inputs (tractors, fertilizers, and irrigation) were next in importance. Regional averages mask differences across countries, however. For example, in the semi-arid tropics, Botswana, Chad, Senegal, Somalia, and Sudan all experienced declines in fertilizer use even though the regional average of fertilizer use increased. In Rwanda, intensity of all modern inputs declined.

A deterioration of agricultural trade performance, either in terms of growth or stability, affected all regions roughly equally. Trade performance deterioration accounted for an annual decrease in productivity of 0.2 to 0.3 percent per year. In the semi-arid and sub-humid tropics, increased export instability accounted for most of this productivity loss. Negative export growth was the major cause of productivity loss in the lowland humid and humid tropics.

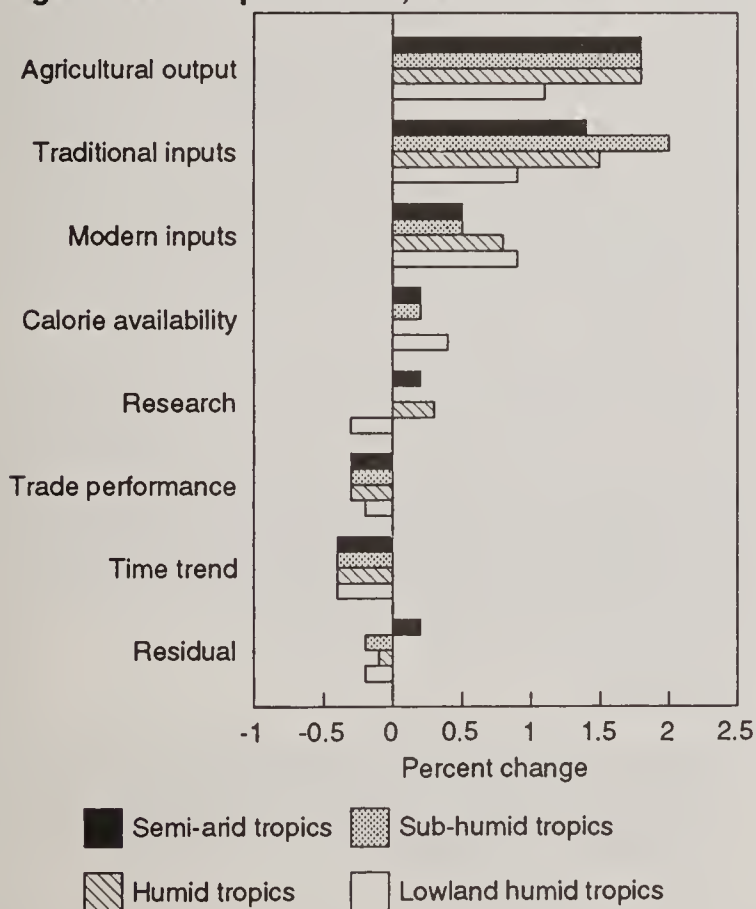
Changes in agricultural research investment contributed appreciably to changes in output in the humid and lowland humid tropics. The negative figure for research for the lowland humid tropics was due to the rather sharp decline in research funding in Madagascar in the 1980's. The impact of research was smaller in the semi-arid tropics and sub-humid tropics.

Improvements in historic calorie availability contributed more positively to output growth than did research in all regions except the humid tropics. It should be noted that the base period is the early 1970's when many areas were suffering from extreme drought. Recovery from the early 1970's drought conditions may have contributed to longer-term productivity growth, particularly in the Sahel region. The results are consistent with other studies that found that improved calorie intake made significant contributions to long-run economic growth in developing countries (2,17).

Finally, we note there is a secular downward trend in productivity not explained by changes in conventional and nonconventional inputs. This result is not uncommon in agricultural productivity studies of developing countries (7,9,10). It sug-

Figure 18

Contribution of Explanatory Variables to Agricultural Output Growth, 1973-75 to 1983-85



'Green Revolution' in Africa?

The closest thing to a 'Green Revolution' in Sub-Saharan African agriculture is probably Zimbabwe's experience with corn, first in its commercial sector in 1960-80, and then in its smallholder sector in 1980-85. Both were based on improved packages of seed and other inputs, and were the fruit of extended government and private efforts in agronomic research, supply, and extension. However, the outcome in Zimbabwe itself has not matched the Asian Green Revolution in rice and wheat in terms of sustainability, and its replicability in the rest of Africa is questionable.

Zimbabwe's commercial farming sector is atypical of Africa's average agrarian structure. Zimbabwe's smallholder corn farmers are more nearly typical of farmers in other African countries. What was their record in 1980-85, and what does it prove?

Beginning in 1980 smallholders rapidly adopted new hybrid corn varieties and fertilizers, with the result that their corn production nearly doubled by 1986 (table 14). However, 1980 was Zimbabwe's first year of independence, and the country was just emerging from a 10-year guerrilla war in the course of which a large segment of the agricultural sector had been seriously disrupted. Corn area harvested, however, had been restored to "normal" levels by the following year. Average corn yields rose above 1 ton per hectare in both 1985 and 1986, which were years of favorable growing conditions. Other factors making for good harvests included higher guaranteed producer prices, a backlog of short-season hybrid corn varieties, the removal of racial and institutional barriers to obtaining credit, and the expansion of the number of grain-buying points.

To gain a perspective on the significance of the 1980-86 record it is necessary to look at what happened after 1986, as well as before. Corn production in 1983 had been depressed by a severe drought. The same thing happened again in 1992. Only large grain imports prevented a famine. But corn production has not again reached its 1985 peak of nearly 1.9 million tons. This is in sharp contrast with the Green Revolution in Asian countries, where rice and wheat production trended upwards following the adoption of higher yielding varieties, even though famine threats reoccurred in India in 1974 due to natural disasters.

Furthermore, corn area in Zimbabwe's smallholder sector has trended downwards almost continuously since 1985, and fertilizer use has declined, indicating that the new technology has not proved profitable to small farmers. A reappraisal of the government's producer price policy and the target level of grain reserves following the record corn crop of 3 million tons in 1985 (an amount equivalent to 3 years of domestic consumption), led to the decision to curb corn production and to reduce grain reserves. The number of grain purchasing points in rural areas was reduced from 125 to 9, making corn marketing more difficult for small farmers. In addition, loans to small farmers have declined in number and in total value since 1986/87.

Researchers point out that Zimbabwe's food supply effort has been focused on corn, a crop that is not very tolerant of the severe drought conditions that recur every 10 years or so. Sorghum and millet would do better at assuring food security. Small farmers have been forced to choose, however, between adopting improved corn technologies accompanied by strong institutional support like that embodied in Zimbabwe's Grain Marketing Board, and unimproved small grain technologies lacking extension or marketing assistance.

But the supply-side situation is complicated by demand-side factors as well. While sorghum and millet have a genetic advantage over corn in terms of drought tolerance, they have a limited market. Years of subsidized consumer prices and distribution of corn meal have created strong consumer preferences. Recognition of the industrial value of small grains by expanding demand from the baking, brewing, and stock feed industries, is probably the only way now to even the balance between corn and sorghum/millet.

The conditions that favored Zimbabwe's smallholder corn production record in 1980-86 may be summed up thus: (1) political leadership committed to a smallholder-dominated agrarian structure by investing a significant share of national resources in smallholder agriculture; (2) the assembling of an efficient system of farmer support institutions, both public and private; and (3) an economic policy environment that provides farmers with incentives to increase their output (1). These three conditions would have to be replicated in other African countries for a Green Revolution to take place, assuming that the needed technology packages exist. But these conditions exist in few African countries. Moreover, the technological problems are far from solved.

Summing up, then, the experience to date in Africa indicates that realization of food security through a Green Revolution depends on the improvement of sustainable farming systems that (1) are technologically and economically adapted to Africa's thin physical resource base and mixed cropping patterns; (2) are amenable to support from Africa's rural institutions, particularly local ones; and (3) meet African consumer preferences undistorted by subsidies and other policy-related, cost-raising mechanisms. [Arthur J. Dommen]

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Table 14--Zimbabwe: Smallholder corn production

Year	Area	Production	Yield	Producer Price	Rainfall
	1,000 ha	1,000 tons	Tons/ha.	Z\$/ton	Millimeters
1980	931	738	0.79	85	751
1981	1,153	1,054	0.91	120	988
1982	1,146	665	0.58	120	468
1983	1,099	308	0.28	120	439
1984	1,166	681	0.58	140	529
1985	1,228	1,877	1.53	180	821
1986	1,114	1,388	1.25	180	791
1987	1,030	544	0.53	180	502
1988	1,036	1,600	1.54	195	742
1989	979	1,351	1.38	215	636
1990	949	1,212	1.28	225	710
1991	885	841	0.95	270	527
1992	728	222	0.30	550	420
1993	1,040	1,134	1.09	900	---

1/ Sanyati catchment area. AMA Annual reports.
Source: (1).

gests, however, that more research is needed to identify other constraints on productivity growth.

Conclusions

Output growth is still driven by increased use of traditional inputs--land, labor, and livestock. Growth of modern input use (fertilizers, tractors, and irrigation) and agricultural research accounted for a 1-percent annual increase in output in the humid tropics. This modern "package" of research and inputs accounted for about half as much growth in other agro-ecological zones.

A 1-percent increase in the index of historic calorie intake was estimated to increase land productivity and agricultural output by more than 0.5 percent. This is consistent with other studies that found a strong responsiveness of economic growth to improvements in nutrition (2),(17). Improved calorie intake contributed more to output growth than did agricultural research in all regions except the humid tropics.

Another important finding is that trade patterns are important determinants of longer-term technical progress. Both agricultural export growth and earnings instability significantly affected agricultural output. Growth had a strong positive impact, while the impact of instability was negative. These latter results suggest there is a strong positive feedback between trade performance and food security on one hand and agricultural productivity on the other.

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Fertilizer Consumption Remains Low

For sustained growth in food production, Sub-Saharan Africa's average fertilizer use needs to increase to 50 kilograms per hectare over the next 10 years. The region's fertilizer use is the lowest in the world, and most is applied on cash crops by commercial farmers. Fertilizer consumption is limited by world prices, government agricultural policies, weather fluctuations, inadequate infrastructure and transportation networks. [Courtney Harold, Bruce Larson, and Linda Scott]

Agricultural performance in Sub-Saharan Africa has been unsatisfactory for the past several decades. Rapid population growth and production constraints have led to a steady decline in per capita agricultural output (see *Agricultural Production: Trends and Constraints*). To increase per capita food intake and improve living standards in the absence of a significant slowdown in population growth, agricultural production needs to grow at an annual rate of about 4 percent over the next 25 years (4).

To boost output, farmers have converted vast tracts of forest and grassland to crop production. Although this practice may support subsistence livelihoods for a time, it is likely to have significant negative implications for the welfare of rural and urban populations and the environment over the long term. Much of the newly converted lands are in marginal areas and are thus likely to be less productive and more easily degraded than existing cropland.

Given these limitations, expansion of cultivated areas alone is unlikely to result in sustainable agricultural growth. Substantial increases in crop yields will also be needed. In addition to policy incentives, adequate germ plasm, water, and soil nutrients have been identified as three essential components for sustained yield growth.

Available germ plasm is adequate in most of Sub-Saharan Africa (17). Some studies have shown that yields of major crops could potentially double with varieties already in use and new ones that are available. The need for sufficient water during the growing season is also well recognized. However, water availability varies considerably across the region. The humid lowlands of west and central Africa and the mountainous highlands of eastern Africa have generally favorable rainfall conditions. In more arid regions, such as the Sudano-Saharan zone, water remains a key constraint outside of irrigated areas (17).

The importance of the water constraint has been confused due to the practice of estimating water requirements and supplies for crops on the basis of average precipitation over crop seasons and years. This practice may be reasonable in areas like Europe and some regions of the United States, where seasonal and annual rainfall variations are small and deep soils provide a reservoir of soil moisture to smooth moisture fluctuations. Such an approach is not appropriate for much of Africa, where high variances in precipitation across locations and years and shallow soils compound the risk of agricultural production.

Adequate soil fertility is the third necessary condition for yield growth. Without sufficient soil nutrients, crop yields cannot increase, be sustained over time, or respond to improved management practices or other inputs. Perhaps more importantly, lack of adequate nutrients will stifle the profitability of other technologies.

Soil Nutrients Needed To Support Sustainable Agriculture

Soil mining, or overexploitation of land, is common in the region. A study in the Sahel concluded that present systems are continuously losing minerals and organic matter due to shortened and sometimes abandoned fallows (21).

The amount of nutrients needed for sustainable agricultural growth depends on the yield objective. Given the current situation, a 3.5-percent annual increase in average yields and a 0.5-percent increase in cultivated area is needed to meet a 4-percent growth objective (4). This rate of yield growth would be more than double present trends in Sub-Saharan Africa, while the land growth goal would be somewhat slower than the current rate. Intensifying agricultural production to achieve a 3.5-percent yield growth rate implies that the region would increase its average grain yields of 1,059 kilograms per hectare in 1991 to 2,650 kilograms per hectare (roughly the current average world grain yield) over the next 25 years (table 15).

Both organic and inorganic fertilizers must be applied to most soils to achieve the level of soil nutrients necessary to increase yields. Worldwide, inorganic fertilizers supply nearly 40 per-

Table 15--Average crop yields and value in Sub-Saharan Africa and the world, 1991

Crop	Yield		Ratio
	Sub-Saharan Africa	World	Sub-Saharan Africa/world
	----- Kg/ha -----		-- Percent --
All cereals	1,059	2,674	0.40
Wheat	1,554	2,408	0.64
Rice	1,583	3,524	0.45
Corn	1,403	3,778	0.37
Sorghum	784	1,317	0.59
Millet	681	757	0.90
Avg value of production, \$/ha 1/			
All crops	239	438	0.55

Sources: FAO (1987a) and USDA (1993).
1/ For an explanation of the international dollar units, \$I, see USDA (1993).

cent of the nutrients used by crops (12,15). The other sources are releases from soil nutrient reserves (46 percent), organic fertilizers (6 percent), biological nitrogen fixation (10 percent of nitrogen), and atmospheric deposition. The present heavy reliance on soil reserves for plant nutrients is not sustainable and highlights the amount of soil mining occurring at a global level.

Consumption Trends

Fertilizer use in Sub-Saharan Africa is lower than in any other region in the world but varies among countries, climatic zone, and farm size. Commercial farmers account for approximately 80 percent of all fertilizer consumption. Most fertilizer is used on cash crops such as coffee, cocoa, cotton, oil palm, sugarcane, and groundnuts. In several countries fertilizer is also used on corn.

To provide adequate soil nutrients for sustained agricultural growth, the region's average fertilizer use needs to increase to 50 kilograms per hectare over the next 10 years (17,24). However, for the past 5 years, the region's fertilizer consumption has stagnated at about 1.7 million tons or 10 kilograms per hectare (figure 19). In many countries, application rates are much lower (figure 20). Of 36 countries for which data were available for 1989-91, nearly half used less than 5 kilograms per hectare while only 2 countries, Swaziland and Zimbabwe, used 50 kilograms or more. By comparison, 8 out of 10 developing Asian countries used 50 or more kilograms of fertilizer per hectare.

For Sub-Saharan countries to reach the 50 kilogram per hectare goal, the region's fertilizer use must increase at an annual average rate of about 18 percent per year over the next 10 years. This is substantially higher than the current regional trend. Actual annual growth in fertilizer application rates from the early 1960's to late 1980's was only 5 percent per year in Sub-Saharan Africa, compared with 13 percent in South Asia, and 9 percent in Southeast Asia.

Sources of Supply

The region's domestic fertilizer production is extremely limited and concentrated in a few countries. During 1989-91, only 10 of the 40 countries in the region produced any fertilizer. Of these 10, Zimbabwe and Nigeria produced 86 percent of the total, with Senegal's output about 12 percent (table 16). Nitrogen fertilizer production rose sharply over the past decade. The increase was due almost entirely to production growth in Nigeria. Aside from Nigeria, there appears to be no overall trend in Sub-Saharan Africa to increase fertilizer production in the near future.

Due to the region's limited production capacity, most Sub-Saharan countries are highly dependent on imports to meet their fertilizer needs. During 1989-91, only 22 percent of all fertilizer used in the region was produced in Sub-Saharan Africa, a rate unchanged from a decade ago. One-third to one-half of all fertilizer imports in the 1980's was part of international aid packages, while the rest was from commercial sources (9). Average yearly fertilizer imports in 1989-

Figure 19

Fertilizer Consumption in Sub-Saharan Africa by Nutrient, 1961-91

Million metric tons

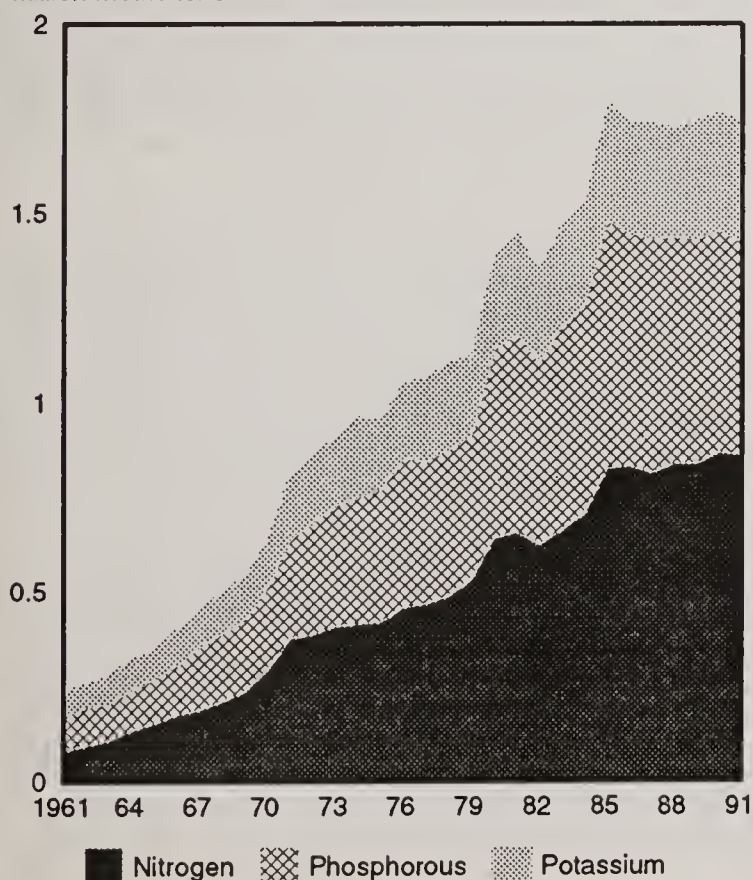


Figure 20

Fertilizer Consumption in Sub-Saharan Africa, 1989-91

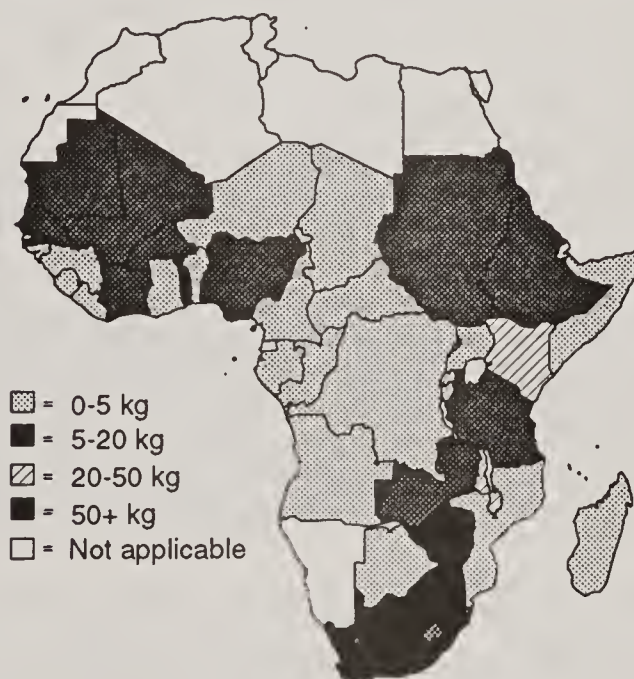


Table 16--Fertilizer production by nutrient in Sub-Saharan Africa, 1971-91

Nutrient/ country 1/	1971-93	1981-83	1989-91
	tons		
Nitrogen	86,430	101,641	370,145
Cameroon	0	2,833	0
Cte d'Ivoire	4,323	2,967	0
Mozambique	6,490	1,867	0
Nigeria	0	0	262,467
Senegal	8,195	3,867	18,982
Swaziland	0	4,267	0
Tanzania	1,123	5,058	3,481
Zambia	6,633	5,807	4,207
Zimbabwe	59,667	74,977	81,008
Phosphorous	75,304	80,368	138,099
Cte d'Ivoire	4,872	2,667	2,500
Mozambique	1,523	933	0
Nigeria	0	6,900	50,730
Senegal	20,308	23,700	41,297
Tanzania	6,867	5,518	1,953
Zambia	0	0	0
Zimbabwe	41,733	40,650	41,619
Total			
Cameroon	0	2,833	0
Cte d'Ivoire	9,195	5,633	2,500
Mozambique	8,013	2,800	0
Nigeria	0	6,900	313,197
Senegal	28,503	27,567	60,279
Swaziland	0	4,267	0
Tanzania	7,989	10,576	5,434
Zambia	6,633	5,807	4,207
Zimbabwe	101,400	115,627	122,627
Total fertilizer production	161,734	182,009	508,244

Source: Agrostat, Database of the Food and Agricultural Organization, Rome, 1993.

1/ Kenya and Somalia were fertilizer producers in the past but no data were available.

1991 were 1 million metric tons. Imports increased steadily in the 1970's, and grew at a much slower rate in the 1980's.

Factors Limiting Growth in Fertilizer Consumption

Currently, fertilizer consumption is limited by a number of factors including government agricultural policies that affect supply, weather fluctuations that affect application rates, and inadequate infrastructure and transportation networks.

Agroclimatic constraints

The sparse rainfall that characterizes much of Sub-Saharan Africa affects fertilizer demand by farmers, especially cash-strapped, risk-averse farmers. For example, in Zambia authorities urge farmers to incorporate fertilizer into the soil before and at planting time. Farmers, however, are very reluctant to risk fertilizer use until rain falls and small plants are clearly visible. This hinders root development, but farmers find it difficult to till dry topsoil and are reluctant to risk incurring fertilizer loss through heavy windstorms before planting (25). Also, applying fertilizer to crops without adequate moisture to dissolve nutrients (especially nitrogen) can "burn" the crop.

Fertilizer availability

Considerable evidence suggests that physical availability has been a key constraint to fertilizer use in Sub-Saharan Africa. One study suggests that non-price factors, such as inadequate supply, untimely local availability, and the lack of credit, have

been more responsible for constraining fertilizer demand than high fertilizer prices in some countries (18).

Transportation problems, which are widespread and are particularly severe in land-locked countries, have hindered the availability of fertilizers. Even when fertilizers do arrive from a port to an inland distribution center, farmers often encounter difficulties in transporting their purchase to the farm. The International Fertilizer Development Center (IFDC) reports that, on average, farmers in Sub-Saharan Africa must travel 18 miles to the nearest fertilizer supply location (10). In Western Niger, for example, expensive and inefficient donkey- and ox-drawn carts are used to transport fertilizers from co-operatives to fields (22). In Tanzania fertilizers are often delivered too late because they have to compete with other higher-value commodities for transport facilities to the interior (13).

The combination of poor transportation infrastructure and the physical properties of fertilizers complicates the timing and availability of farm-level supplies (24). Many problems can arise in importing and distributing a bulky input whose chemical composition can be affected by exposure to heat and humidity (3).

Government policies

In several African countries governments have subsidized fertilizer prices to stimulate agricultural production. Subsidies serve to defray high input costs and have had a positive effect on fertilizer use in the region (1, 10). However, they have also placed a great strain on government budgets and have raised questions about competitiveness and efficiency.

In the early 1980's a typical subsidy ranged from 20 to 50 percent of the retail fertilizer price (7). Aside from the budgetary impact, it is argued that subsidies did not benefit the producers who need them most. Another criticism is that fertilizer subsidies lead to unproductive use and encourage wastefulness. A study in Zambia found that subsidies promoted cross-border sales to Malawi, Zaire, and Tanzania, where fertilizer prices were higher (25).

Because of these concerns, government fertilizer policies began to change in the late 1980's. Some countries completely removed subsidies, which resulted in drastic reductions in fertilizer use. Learning from this experience, several countries plan to gradually eliminate subsidies over several years. In Zambia the fertilizer subsidy is scheduled to be phased out over 5 years. More timely fertilizer deliveries will be used to raise yields and offset the impact of the price increase (25).

Some governments in the region are trying to reduce fertilizer expenditures by reducing the cost of fertilizer imports. For example, several countries are beginning to import fertilizers in bulk and in large quantities (above 40,000 tons), and are blending and bagging the fertilizer locally. Still, most countries in Africa use complex and compound fertilizers that are custom-made abroad in small quantities. Their use leads to relatively higher fertilizer costs.

Prospects for Consumption Growth

A number of factors, including policy reform, improved access to agricultural technology and extension services, and increased domestic fertilizer production, are likely to affect the region's future fertilizer use. However, whether these factors will ultimately have a negative or positive effect on fertilizer consumption is not clear.

Policy reform

Changes in agricultural policies could affect fertilizer application rates in a number of ways. For example, the removal of subsidies will subject farmers to world market price increases, and will have a negative impact on fertilizer use in the short run. On the other hand, global trade liberalization is likely to affect fertilizer use, as it will expose Sub-Saharan Africa to world market conditions. Some researchers claim this will increase the region's use of modern inputs because increased competition will cause input prices to fall (1). The implementation of a two-tiered pricing system, where commercial farmers and smallholders pay different prices for fertilizer, has been successful in increasing fertilizer use in Malawi (25).

Access to technology and agricultural education

Improvements in agricultural education and extension would also assist in expanding fertilizer use and agricultural production. There is a great need for information disbursement and training in the use of fertilizers. Increasing the number of extension agents in rural areas would aid in education and also teach farmers about possible harmful effects associated with inappropriate fertilizer application.

In addition, appropriate technology must accompany fertilizer use. Adoption of new technologies has not been widespread in the region. Some researchers claim that there is a mistrust of the "outside" technologies introduced in some areas (11). A complete fertilizer management system will have to account for both weather fluctuations and the risk-averse behavior of producers.

Domestic Production Potential

There is great potential to expand both phosphorous and nitrogen fertilizer production on the continent. Phosphorous deposits exist in 36 Sub-Saharan African countries, and of these, 11 have deposits that have been classified as reserves that would be economically viable to mine (19). These countries include Mali, Burkina Faso, Guinea-Bissau, Mauritania, Niger, Senegal, Togo, Uganda, Tanzania, Zambia, and Zimbabwe. The potential for increased nitrogen fertilizer production also exists in several countries with abundant natural gas reserves such as Cote d'Ivoire, Ghana, Nigeria, Gabon, Cameroon, Congo, Tanzania, Mozambique, and Angola.

Despite the region's natural resource endowments, there are many obstacles to increased fertilizer production. First, building a large-scale fertilizer plant requires substantial financial investments and has high accompanying maintenance costs. A processing plant also requires constant supplies of energy inputs, labor, and processing elements. Securing these supplies is often problematic.

Fertilizer marketing structures also limit production in many countries. Most production operations are government-operated or semi-private and are often unresponsive to market demands. Privatization of the fertilizer industry may stimulate production and eventually consumption, since added competition could cause fertilizer prices to fall. Many governments have plans to privatize fertilizer distribution (23). Although partial privatization has recently occurred in Nigeria, nowhere in the region has privatization been fully achieved.

The switch from public to private fertilizer production is not an easy one. Private companies are reluctant to invest in fertilizer production plants due to low consumption rates and the high risk involved. One study found that companies (and countries) were overwhelmingly reluctant to expend the investment capital required to build a fertilizer plant because of the lack of farmer demand (20). Constraints such as these suggest that prospects for a completely private fertilizer industry remain poor.

On the other hand, Sub-Saharan Africa may not need to increase its fertilizer production capacity. First, the cost of fertilizer imports is small relative to overall imports. Moreover, world fertilizer supplies are adequate, and there may be excess capacity in the future due to environmental concerns about overuse of fertilizer in the United States and Western Europe. Consequently, real international prices, which have fallen over the last 20 years, should remain favorable for the foreseeable future.

Conclusions

Substantial agricultural growth, of about 4 percent annually over the next 25 years, is necessary for sustained economic development and improved human welfare in Sub-Saharan Africa. To slow environmental degradation from deforestation and production on ecologically fragile lands, much of this growth should come from increasing yields rather than land area.

Recent research concludes that average fertilizer application rates in Sub-Saharan Africa must climb from the current 10 kilograms per hectare to 50 kilograms within the next 10 years to prevent continued mining of soil nutrients (17, 24). This 18-percent annual increase is substantially greater than current trends in the region.

Farmer demand for fertilizers, government agricultural policies, and the physical capacity to make fertilizers available are the key issues that will determine whether this goal is attained. Several studies document that the timely physical availability of fertilizers to farmers, in appropriately-sized packages, remains the main constraint to increasing fertilizer use in Sub-Saharan Africa.

An adequate fertilizer supply at the farm level remains essential for maintaining reasonable fertilizer costs even when domestic prices are tied to world prices without subsidies. Improved marketing systems, particularly through increased private marketing and better infrastructure, will reduce farm-gate prices of fertilizers, regardless of their origin.

If fertilizer supplies are going to continue to be unreliable or prohibitively costly, then viable substitutes for commercial fertilizers need to be adopted that would achieve the same goal of increasing yields. Besides the established practice of using livestock manure, legume rotations are being experimented with in some parts of the region as well as the planting of leguminous trees interspersed with crops. Using new plants as a green manure source is also being explored as an alternative to traditional practices. But this requires sacrificing area in food crops and applying additional labor.

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Land Tenure in Sub-Saharan Africa

Traditionally, in Sub-Saharan Africa individuals did not have permanent, transferable title to the land they cultivated or grazed. However, as availability of cultivable land has declined with rapid population growth, Africa's land tenure patterns have changed. Common property regimes on arable land have given way to private property regimes. Such changes, however, offer no guarantee of increased agricultural productivity. [Arthur J. Dommen]

Introduction

Sub-Saharan Africa has experienced a significant decline in agricultural land per capita in recent decades due to high rates of rural population growth. Declining availability of cultivable land has in turn induced changes in African land tenure patterns. As average farm size has decreased, land has become increasingly viewed as a private rather than a public good, with a consequent impact on relationships of individuals with respect to land use.

Agricultural population per hectare of arable land in Sub-Saharan Africa has grown for all regions (fig. 21). Rural population densities per hectare of arable land in excess of 3.0 in East Africa, particularly, appear to be associated with marginal or inadequate diets (table 17). While a small group of relatively well-off countries have quite low rural population densities and adequate diets, no significant cause and effect relationship can be inferred. This latter group includes Senegal and Côte d'Ivoire, countries that depend on trade for a significant part of their food supply. Also, such comparisons overlook differences in quality of soils and climate, which affect a country's ability to feed its population using its own land resources.

Prevalence of Common Property Regimes

Historically in much of Sub-Saharan Africa, common property regimes have been associated with land-extensive, subsistence-type agriculture. Individuals did not have permanent, transferable title to the land they cultivated or grazed. Membership in a tribe, family, or community--plus a demonstrated intent to use the land--gave individuals occupancy and use rights to a portion of the land.

Generally low population density and traditional technology have not encouraged the concentration of landholding through much of the region. There is evidence that early village settlers obtained better quality land, so the system was not entirely egalitarian. However, new families in a village were entitled to use of the land they cleared of bush.

Private Property in Parts of Africa

As the value of arable land rises due to its increasing scarcity, however, a premium is placed on control over productive land. In the vicinity of towns and cities that provide a ready market for agricultural produce, common property regimes on arable land have given way to private property regimes. Land assumes a rental value, and often rent is demanded in the form of cash rather than in the traditional form of gifts or

Figure 21

Agricultural Population per Hectare of Arable Land

Persons per hectare

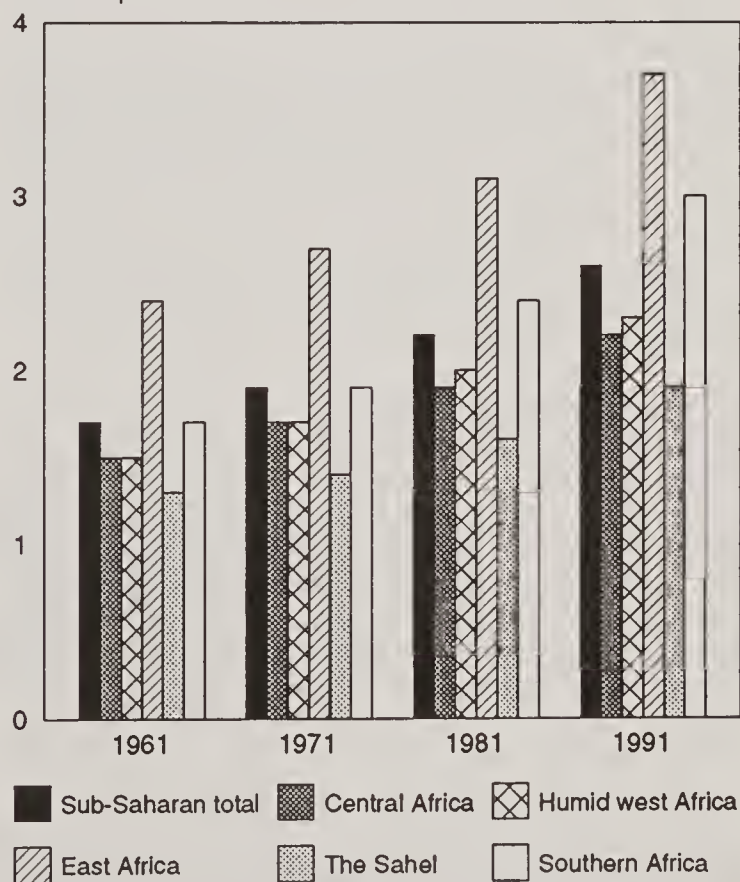


Table 17--Rural population per hectare of arable land and average calories per capita, 1990

Country	Rural population density	Average calorie intake
	Persons/ha	Per capita
Kenya	7.42	2,047
Somalia	6.33	1,830
Tanzania	6.11	2,181
Rwanda	5.74	1,961
Burundi	3.89	1,923
Mozambique	3.32	1,803
Ethiopia	3.14	1,694
Cote d'Ivoire	1.93	2,411
Senegal	1.88	2,328

Source: FAO Agrostat database.

services. In addition, private property regimes have prevailed through history in some countries like Ethiopia, where the closest thing in Africa to a feudal landholding system developed. Private property also developed in more recent history in southern Africa due to white settlers appropriating land for farming and cattle raising.

Where private land ownership is poorly established, traditional mechanisms for controlling land use start to break down. Where arable land and grazing land resources are in principle available for use by all the members of a community, for instance, increased demand can often lead to abuses. Common property regimes then give way to open access regimes, where property rights no longer exist and each individual's interest is to maximize use of the available resources in the short term regardless of the longer-term consequences. This trend has immediate effects on loss of soil fertility, loss of tree cover, and desertification.

Effecting the Transition

Where smallholder farming prevails, as in the Sahel and West Africa, farming systems have on the whole adapted well to the transition from common property to private property regimes. In the peanut basin of Senegal, for example, the privatization (illegal) of land has been a function of the emergence of the nuclear family in place of the extended family. This change in family structure has been a product of the spread of new technology, increasing monetarization of the rural economy, and the accumulation of household wealth.

The husband and wife, together with their children, increasingly make production and marketing decisions on their own without consulting the village elders and frequently prohibit the others from collecting food, cutting firewood, and grazing animals on their land. Each family makes known the borders of its fields and exercises its exclusive prerogative of transmitting the land to its male children. Common property is increasingly relegated to degraded and infertile land that lies between villages and has little attraction for private owners.

Land-Abundant Situation

Another situation arises where land is so abundant that there is little incentive for privatization, except where large towns in the vicinity provide ready produce markets. This situation prevails in the forest areas of Central Africa, with a relatively

low density of rural population and an abundance of land waiting to be cleared. Here, cultivated area per household is limited by available family labor for cutting trees rather than by crowding of rural population. Even under privatization, much of the land would remain in forest. In places like this, land tenure is likely to be less of a constraint to maintaining productivity than other factors such as the lack of appropriate technologies for managing tropical forest soils, untimely arrival or nonavailability of inputs, and high transport costs.

Legislative Changes

Legislation passed in recent years nationalizing land has complicated the situation in countries such as Nigeria by increasing the ambiguity and uncertainty surrounding land use. Farmers do not know whether the investments they may make in land improvement will eventually benefit themselves and their families, or if the state can take the land away from them. This has been the opposite of the intended effect of such land legislation.

Under a 1974 land reform program, Ethiopia replaced a feudal system with state ownership of large farms and attempts at large-scale cooperative farming. Since the change of government in 1991, there has been a gradual return to a private property regime, which seeks to avoid the previous concentration of landholding by dispossessing the church and other former big landholders.

In Kenya, government policy prior to independence focused on the establishment of private property under the Swynerton Plan. This plan vaunted the benefits of private property for developing agriculture, even if it meant creating a landless class as a side effect to land reform. Results of this policy have been mixed. The transfer of European-owned, large-scale farms in the Highlands to African smallholders involved the subdivision of lands originally held under 999-year leases into smaller units.

Intended in part to ease the problem of landlessness, the project failed to have a significant impact. Smallholders, settled in high population density areas that were often on marginal land, were saddled with inadequate services and a substantial debt burden. Large-scale farmers, on the other hand, generally received better quality land in low population density areas. Some research indicated that the productivity achieved was higher in high-population areas than in low-population areas (1).

Dual Landholding Systems

In Southern Africa, another exception to common property regimes arose with the historically rooted dual ownership system. Minority white settlers took the best agricultural land and adopted a private property system, which was called Commercial Areas in Zimbabwe. The rest of the land was placed under a common property regime, called Communal Areas in Zimbabwe. Zimbabwe's Communal Areas cover 16.4 million hectares and have a population density of 25.2 persons per square kilometer with an annual population growth rate of 2.7 percent. The Commercial Areas cover 14.2 million hectares and have a population density of 9.4 persons per square kilometer with a population growth rate of 1.9

percent per year. Since independence in 1980, an additional system has been created, referred to as Resettlement Areas, but this covers only 2.6 million hectares. While the government of Zimbabwe, on equity grounds, has had land redistribution on its agenda since independence, it has chosen to go slowly on grounds of efficiency (5).

The Republic of South Africa has a land ownership pattern that is even more skewed than that of Zimbabwe, also as a result of historical factors. Until now, the government avoided committing itself either to redistributing the freehold lands owned by whites or to converting the common property regime characterizing land ownership in the tribal areas to private property. However, with a new government now in place, a consensus has been reached as to the need for land reform, but not about how it should be accomplished.

In Lesotho, where freehold land does not exist and where land matters are administered by local tribal chiefs, sharecropping arrangements have become a way of dealing with growing population pressure and shortages of non-land inputs like labor, draft power, and cash. Typically, such arrangements allow landholders who lack draft oxen or tractors to get their land cultivated. The arrangements are also known as half-share plowing because the output is shared equally. Households contributing land are often headed by older women.

Pastoralism More Amenable to Common Property

Pastoral societies throughout the continent, because they are based on the most land-extensive system of land use, have generally retained common property regimes for managing their grazing resources. Typically, herders in semi-arid savanna areas are able to quickly move their livestock in response to highly variable rainfall patterns. The main factors of change operating on such societies are a reorientation away from subsistence production and toward more market-oriented production and engagement with more cosmopolitan economic institutions.

In countries like Botswana the movement toward commercialization of livestock production has advanced rapidly. Other societies, like the Dinka and the Nuer in Sudan, have barely begun to make the transition, while the Maasai and Fulani in Kenya and Tanzania are probably at an intermediate stage. The prospects for privatization of range under African conditions remain doubtful because of the large capital investment required for acquisition of extensive rangeland, while the breakdown of traditional rules of range use has created chaos in many places. On the other hand, an attempt to return to traditional systems would be viewed as a step backwards.

Land Tenure's Role Debated

As land available for agriculture has declined and population has grown, land tenure has become the focus of a debate between those who argue that private property regimes facilitate the intensification of agricultural production and those who maintain that traditional landholding systems are efficient, at least up to some critical point of population density. In between are those who argue that the perceived inefficien-

cies of common property forms of land tenure are really the result of the poor operation of land, labor, inputs, and output markets.

In Zimbabwe, for example, commercial farmers are not free to sell their "private" land as they wish, and communal farmers also face a legal prohibition against land sales that has the effect of driving the land market underground, with great loss of efficiency. Similarly, in South Africa, where a private property regime dominates the agricultural sector, the "qualified freehold" that prevails involves major restrictions on the marketability of land, not the least of which is a restriction on the freedom to sell land to black farmers. Such qualifications to private property exert a powerful influence on land and labor markets, and accordingly on efficient production. What is at issue in this debate, in fact, is the web of market relations and incentive structures underlying the property regime.

Empirical Evidence Inconclusive

Attempts to gather evidence to resolve the debate over land tenure and efficiency have proved inconclusive. Migot-Adholla and other researchers studied land tenure systems in Kenya, Ghana, and Rwanda, and found no systematic relationship between land rights and productivity (2). Although improvements were observed when land rights tended to be more permanent, the results were mixed. The researchers attributed the lack of investment in more individual tenure to market failures in markets for land, credit, and output.

Land title registration is seen by some as an appropriate efficiency-heightening measure under certain circumstances. However, a study by Shipton of Kenya's experience with land registration programs during the past 35 years revealed that they have failed to increase agricultural production (4). The reasons why land registration is favored or disfavored by farmers are diverse, as seen from the data in table 18 (3). Moreover, land title registration programs are extremely expensive to implement and maintain.

Table 18--Perceived benefits and drawbacks of land title registration in Uganda, 1987

Item	Households with--		
	All parcels registered	Some parcels registered	No parcels registered
	Percent		
Benefits of registration			
Security against disputes	65.5	62	47.8
Security against eviction	31.0	33.8	32.2
Security for credit	31.0	43.7	59.1
Other benefits	3.4	1.4	2.6
No benefits	0.0	0.0	0.9
Drawbacks to registration			
Prefer indigenous system	27.6	11.3	11.3
Do not know procedures	44.8	22.5	34.8
Procedures too complicated	51.7	47.9	49.6
Procedures are too costly	3.4	14.1	33.0
Do not wish to upset family and/or neighbors	31.0	22.5	16.5
Other	0.0	9.9	9.6

Note: Column totals do not add to 100 due to multiple responses.
Source: (3).

Conclusion

There appears to be no overwhelming case for carrying out land reforms in Sub-Saharan Africa on the grounds of efficiency gains alone. Agricultural producers in Africa appear able to make do with a variety of land tenure arrangements. Reliable and timely input supplies, assured markets for their output, and lower transport costs appear to be factors more closely linked to maintaining farmers' productivity and achieving significant gains in agricultural production.

Population growth, commercialization of production, and other forces are reshaping the way land resources are controlled in crop and livestock production. In the meantime, environmental concerns argue strongly against interfering with traditional systems of land control by local communities that risk turning common property into open access regimes. In the relatively few cases where equity questions concerning skewed distributions of landholding may lead to redistribution, the changes offer no guarantee for improving productivity.

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Environmental Problems and Resource Constraints

Loss of vegetative cover, soil and rangeland degradation, and erosion are among the many environmental problems facing Sub-Saharan Africa. Population pressure, slow economic growth, and inadequate policies significantly affect the region's environment. Madagascar is one of the few countries in the world to have entered into a World Bank-sponsored National Environmental Action Plan wherein environmental issues are identified and appropriate policy responses are developed. [Denice Gray and Bruce Larson]

Sub-Saharan Africa is at the heart of the sustainable development debate. The region faces the enormous challenge of increasing food output, stabilizing populations, encouraging economic development, and conserving natural resources for future growth and generations (12). While natural resource and environmental issues have only recently been considered, they are of growing importance. The region's countries rely heavily on their natural resource base for sustenance and economic growth. Since much of the population resides in rural areas, resource degradation is keenly felt by many people. Urban populations also face environmental problems. Policies aimed at reducing environmental problems hold the promise of moving these countries toward a sustainable development path.

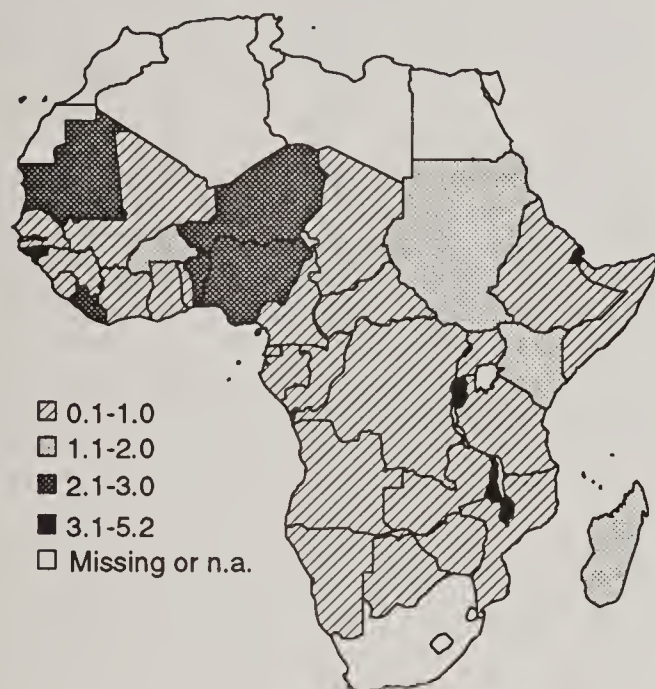
Environmental Problems

Sub-Saharan Africa faces a myriad of environmental problems. One of the most serious is the loss of vegetative cover, which leads to declining soil fertility and increased soil ero-

sion. Deforestation and conversion of savanna to cropland are the primary causes of vegetation loss. These trends show little sign of slowing, and may accelerate if the underlying causes are not addressed.

The region contains the second largest area of tropical forest in the world, after Latin America. These forests provide a variety of wood and nonwood products, habitat for humans and other species, and critical environmental services. However, farmers and loggers continue to clear the region's forests and woodlands at a rapid pace. Between 1980 and 1990, Sub-Saharan Africa's forests and woodlands declined at an annual rate of .6 percent. However, the yearly drop exceeded 3 percent in four countries, Comoros, Cote d'Ivoire, Malawi, and Mauritius (fig. 22). West African countries have had particularly rapid losses of forest cover. Central African countries, including Cameroon, the Central African Republic, the Congo, Gabon, and Zaire, still contain large stretches of tropical forest.

Figure 22

Average Annual Deforestation Rates, 1981-85

The effects of deforestation are many. A significant share of the region's wildlife habitat has already been lost, with severe implications for the survival of certain species and biodiversity (13). Soil erosion and loss of productive capacity often result when tropical soils are deforested. Essential hydrological functions are also lost. Such changes threaten the lifestyles and survival of forest dwellers and increase the distance that rural people must travel to gather fuelwood, which 90 percent of African households use for cooking. Deforestation and burning of forests also have potentially severe effects on global climate change, as well as regional atmospheric problems such as acid rain.

In addition to the erosion caused by deforestation, the region's soils are prone to degradation due to many other factors including weather and cultivation practices. Only 13 percent of Sub-Saharan Africa's total land area has no physical or chemical constraints. Physical constraints, such as steep slopes, shallow soils, poor drainage, and tillage problems, and chemical constraints, such as low nutrient retention, aluminum toxicity hazard, phosphorus fixation hazard, and low potassium reserves, individually affect between 4 and 20 percent of the total Sub-Saharan African land mass (table 19).

During the dry season, many areas face severe soil drying which, when combined with strong winds, can result in soil erosion. Soils are also subject to erosion due to heavy seasonal rains. Farming practices that include ineffective conservation measures can also cause soil degradation and erosion. Of the

human-induced causes of soil degradation in the region, overgrazing accounts for 49 percent and other agricultural activities account for 24 percent (17). More than 20 percent of all vegetative land is degraded due to human causes, with water and wind erosion accounting for the majority of the affected hectares (table 20). Much of this degraded area is in the Sahel, Sudan, Ethiopia, Somalia, Kenya, and southern Africa.

Rangeland degradation is the third major environmental problem in the region. Between 1961 and 1993, the number of cattle increased by 60 percent in Sub-Saharan Africa (7), but the quantity and quality of rangeland decreased. The best grazing areas were converted to croplands, while herds were forced onto easily degraded marginal lands. Interference with migration routes and cultivation of river bottom lands forced herds to remain on degraded rangelands and near permanent water sources. Below normal rainfall and droughts have also hastened rangeland degradation. Wells drilled to address water scarcity have increased desertification due to an increased concentration of animals.

Depletion and degradation of water resources is the final major environmental problem facing Sub-Saharan Africa. Water is a critical resource for both human survival and agricultural production, but its use faces increasing conflicts due to rising populations and economic development. Within 25 years, if the population growth rates continue as projected, per capita water availability will decrease to half its present level in almost all countries in the region. By the year 2000, ten countries will confront serious water depletion: Mauritania, Niger, Somalia, Kenya, Burundi, Rwanda, Malawi, Zimbabwe, Namibia, and Lesotho (1).

The agricultural sector consumes over half the annual freshwater withdrawals in the majority of the Sub-Saharan African countries, and could face greater competing demands from household and industrial uses. Water for livestock is already in short supply in many parts of arid and semi-arid Africa. Water resources are also facing various and increasing forms of degradation: sediment runoff, siltation, agro-chemical runoff, and industrial and household pollution. The causes include deforestation, cropland expansion, soil erosion, improper drainage, inadequate irrigation planning, poor enforcement of environmental regulations, and destruction of shoreline vegetation.

All these forms of environmental degradation affect current and future agricultural production. Deforestation leads to the cultivation of fragile soils and erosion, which in turn causes nutrient mining and reductions in the soil's moisture retention capacity. Degradation of pastures and rangelands reduces their carrying capacity. The quality and availability of water resources affects crop and livestock choices.

Underlying Factors

All of the region's environmental problems have causes in, or are exacerbated by, underlying factors. The region faces inherent limits on its resources. Demographic changes are placing increasing pressure on resources, while slow economic growth is reducing the ability to pay for environmental protection. Historically, farmers adjusted to resource con-

Table 19--Soil constraints in Sub-Saharan Africa

	No soil constraint	-----Physical constraints----- Steep Shallow	-----Chemical constraints----- Drainage Tillage Nutrient Aluminum Phosphate Potash						
Country									
Percent of total land area									
Coastal West Africa	3	8	17	10	1	5	37	16	39
Benin	2	5	9	11	2	1	9	0	12
Ghana	1	4	11	9	2	4	28	22	31
Guinea	2	15	44	6	0	2	34	17	37
Cote d'Ivoire	0	4	6	5	0	3	65	55	68
Liberia	2	8	10	19	0	10	79	30	78
Nigeria	10	7	14	13	2	13	18	6	21
Sierra Leone	3	13	22	8	0	5	56	1	56
Togo	5	8	18	10	3	1	7	0	11
Sahel	24	11	22	8	3	10	5	0	6
Burkina Faso	24	5	10	16	9	7	2	1	3
Cape Verde	11	41	57	0	1	3	0	0	0
Chad	25	5	25	6	7	16	2	0	4
Gambia, The	36	1	3	22	0	0	17	0	17
Guinea-Bissau	0	17	29	10	0	6	15	0	24
Mali	28	6	15	5	1	14	1	1	2
Mauritania	28	6	25	0	0	9	0	0	0
Niger	38	6	12	3	1	29	0	0	0
Senegal	16	4	14	12	2	29	4	0	5
Central Africa	3	5	5	15	1	16	52	13	60
Cameroon	4	4	4	10	3	2	72	11	74
Central African Rep	1	4	6	9	0	21	53	17	70
Congo	0	1	0	31	0	33	48	7	59
Equatorial Guinea	1	5	5	21	0	10	52	1	59
Gabon	0	5	2	13	0	14	51	12	57
Zaire	1	3	0	18	0	29	72	28	75
East Africa	12	17	16	6	6	4	17	14	27
Burundi	3	14	4	10	4	0	53	47	76
Djibouti	29	1	53	1	0	0	0	0	0
Ethiopia	13	32	13	1	10	2	6	4	11
Kenya	11	15	16	4	5	4	5	2	10
Rwanda	4	39	9	10	0	0	31	29	67
Somalia	5	7	10	2	3	5	1	1	3
Sudan	31	7	13	8	18	9	5	2	4
Tanzania	3	18	8	9	6	9	34	29	46
Uganda	3	11	11	12	4	4	58	18	63
Southern Africa	5	22	17	6	2	14	18	7	29
Angola	3	5	5	13	1	35	30	9	45
Botswana	6	1	3	5	9	49	0	0	16
Comoros	4	34	23	0	0	0	19	8	39
Lesotho	0	63	50	7	0	0	0	0	0
Madagascar	4	11	5	6	1	8	36	15	40
Malawi	12	27	20	6	2	5	29	10	36
Mauritius	4	24	22	3	4	0	11	9	31
Mozambique	6	7	9	4	2	17	20	10	25
Swaziland	0	24	19	14	1	7	24	17	32
Zambia	2	4	7	19	4	25	41	15	44
Zimbabwe	2	8	13	3	7	15	3	2	15
All regions	13	8	11	9	5	16	23	9	28

Table 20--Human-induced soil degradation in Africa

Primary effect	Secondary effect	Degree of degradation				
		Light	Moderate	Strong	Severe	Total
Million hectares						
Water erosion	Topsoil loss	53.9	60.5	86.6	3.8	204.9
	Terrain deformation	3.6	6.9	11.7	0.4	22.5
Wind erosion	Topsoil loss	79.1	84.2	7.4	0.0	170.7
	Terrain deformation	9.2	5.1	0.0	0.0	14.3
	Overblowing	0.0	0.0	0.5	1.0	1.5
Chemical depletion	Nutrient loss	20.4	18.8	6.2	0.0	45.1
	Salinization	4.7	7.7	2.4	0.0	14.8
	Pollution	0.0	0.2	0.0	0.0	0.2
	Acidification	1.1	0.3	0.0	0.0	1.4
Physical degradation	Compaction	1.4	8.0	8.8	0.0	18.2
	Waterlogging	0.4	0.1	0.0	0.0	0.5
Total		173.6	191.8	123.6	5.2	494.2

Source: (11).

straints by using shifting and fallow cultivation. However, population pressures have reduced the practice of these sustainable agricultural techniques, leading to rapid declines in land productivity. Political and institutional factors have not evolved rapidly enough to compensate for the demographic changes. As a result, in many countries, policies and structures that had once been effective in promoting natural resource management, have now become part of the environmental problem.

Although Sub-Saharan Africa has a vast and diverse land area, the region faces a number of resource constraints to sustainable agricultural growth. Some areas have a high degree of agricultural potential. Central Africa, humid west Africa, and southern Africa, for instance, have substantial areas of arable land with relatively low population pressures. On the other hand, most of the Sahel, parts of mountainous east Africa, and the dry region spreading through Angola, Botswana, Lesotho, and southern Mozambique, have relatively little arable land and large populations, and rely on food imports.

The region's inhospitable environment is a major constraint on agriculture. Approximately 20 percent of the continent is desert, while another 10 percent has soils too sandy for agricultural production (table 21). Much of the arable soil is coarse and contains so little clay that moisture retention is hampered and lands become susceptible to erosion.

Rainfall is seasonal and often heavy. Two-thirds of the continent is arid or semi-arid, often facing multi-year droughts and rainfall that can vary by 30 to 40 percent each year. Forty percent of the rainfall occurs at a rate heavy enough to cause erosion and loss of soil nutrients. In temperate zones of the world, only 5 percent of the rainfall is at such a heavy rate. While about 30 percent of the region's land area can support rainfed crop production, only about one-fourth of it is used for crops. The remainder is mostly under primary forest. Irrigation is available on 5 million hectares, primarily in Madagascar, Nigeria, and Sudan. Another 20 million hectares may be suitable for irrigation.

Demographic factors, such as rapid population growth and rural migration, are another underlying cause of environmental problems (see Population article). High population growth rates and population densities place increasing pressure on land resources. Rural-to-urban migration has dramatically increased, while rural-to-rural migration is also occurring. Both forms of migration place pressure on sustainable agricultural practices. Male urban migration can cause localized rural labor shortages. Often, sustainable agricultural techniques are foregone when labor becomes scarce. Rural-to-rural migration can bring an influx of immigrants who do not know local sustainable practices and can cause unintended environmental damage.

The rigidity and inappropriateness of political and institutional structures are another underlying cause of resource degradation and environmental damage. Comparing case studies of agricultural production on fragile lands, some areas are able to maintain long-term sustainable use, while in other areas, production leads to environmental degradation and agricultural disintensification.

Table 21--Climate types in Sub-Saharan Africa

Country	Total land area	-----Climate type-----		
		Arid	Semi-arid	Humid

	1,000 ha	Percent of total		
Coastal West Africa				
Benin	11,062	0	1	99
Ghana	23,002	0	0	100
Guinea	24,586	0	0	100
Cote d'Ivoire	31,800	0	0	100
Liberia	9,632	0	0	100
Nigeria	91,077	0	8	92
Sierra Leone	7,162	0	0	100
Togo	5,439	0	0	100
Sahel				
Burkina Faso	27,380	1	15	84
Cape Verde	403	100	0	0
Chad	125,920	67	7	27
Gambia, The	1,000	0	0	100
Guinea-Bissau	2,812	0	0	100
Mali	122,019	64	15	21
Mauritania	102,522	94	5	1
Niger	126,670	86	13	1
Senegal	19,253	7	14	80
Central Africa				
Cameroon	46,540	0	1	99
Central African Rep	62,298	0	0	100
Congo	34,150	0	0	100
Equatorial Guinea	2,805	0	0	100
Gabon	25,767	0	0	100
Zaire	226,760	0	0	100
East Africa				
Burundi	2,565	0	0	100
Djibouti	2,318	100	0	0
Ethiopia	110,100	38	16	44
Kenya	56,697	71	14	15
Rwanda	2,495	0	0	100
Somalia	62,734	93	7	0
Sudan	237,600	55	11	34
Tanzania	88,604	7	15	78
Uganda	19,955	0	5	95
Southern Africa				
Angola	124,670	4	8	87
Botswana	56,673	62	38	0
Comoros	223	0	0	100
Lesotho	3,035	15	13	66
Madagascar	58,154	5	8	87
Malawi	9,408	0	0	100
Mauritius	185	0	0	100
Mozambique	78,409	8	9	82
Swaziland	1,720	0	26	74
Zambia	74,072	0	2	98
Zimbabwe	38,667	8	41	51
All regions	2,158,343	33	9	58

Source: (11).

The difference between the two outcomes is often the responsiveness of policies and institutions to localized changes, and their appropriateness to farming on marginal lands rather than on prime agricultural land. In a case study in Rwanda, for instance, the promotion of annual rather than perennial crops has increased soil erosion. In Kenya, land adjudication policies have forced rural households to remain on a fixed land area, rather than taking advantage of different agro-ecological niches as they had formerly. The result has been increased cultivation of fragile lands. It was found that those policies that allowed households to balance subsistence needs with economic diversification permitted sustainable use of farmland. Similarly, policies that neglected rural transportation and infrastructure reduced diversification opportunities and increased pressure on natural resources.

The final underlying cause of environmental degradation is economic constraints. Since the early 1980's, Sub-Saharan Africa has been struggling with slow economic growth, de-

clining terms of trade, and heavy foreign debt loads (see *Economic Trends and Trade Issues*). These problems are partially due to the region's resource, demographic, and policy constraints. Slow economic growth hampers the introduction of new technologies, including those that are productivity-enhancing or resource-conserving and constrains the willingness and ability to pay for environmental protection. It also increases reliance on the subsistence sector by dampening internal demand for agricultural products.

Sub-Saharan African countries have used a variety of policies and programs to address environmental problems. The next section discusses environmental policy in Madagascar, providing a case study of one country's approach. Madagascar's key environmental problems, soil degradation, habitat and biodiversity loss, and poor water and sanitation systems, are also common to Sub-Saharan Africa. At the same time, the country's economic situation, reflected by widespread poverty, political uncertainties, and little institutional capacity for environmental management, is also common to the region. Therefore, the problem identification and policy response process in Madagascar illustrates the opportunities and pitfalls in stemming environmental degradation in Sub-Saharan Africa.

Environmental Policy in Madagascar

Madagascar has used the World Bank-sponsored National Environmental Action Plan (NEAP) process to identify environmental problems and develop appropriate policy responses. NEAPs are intended to "provide a framework for integrating environmental considerations into a nation's economic and social development" (4). In addition to being one of the first, Madagascar was one of the few countries to begin a NEAP process. The country will receive about \$85 million over 5 years from several donors to support initial implementation activities. Total funding for the NEAP is expected to range from \$300 million to \$400 million over 15 years.

The Madagascar NEAP process initially identified and focused on three general environmental problem areas: soil degradation; loss of biological diversity; and urban and rural water and sanitation. However, the implementation activities, as part of the Environment Program-I (EP-I), are focused primarily on the loss of biological diversity and soil degradation. The NEAP concludes that Madagascar's soil degradation problems arise from three distinct sources: the burning of pasture at the end of the dry season in the west; the expansion of rain-fed agriculture onto hillsides surrounding irrigated rice fields in the high plateau region; and the expansion of agriculture in forested areas ("tavy" production) in the eastern region. For each of these sources, policies are evaluated in terms of the on-site costs due to soil degradation and the off-site costs due to damage to roads, harbors, and irrigation systems.

Madagascar is considered to be one of the megadiversity countries which, along with Mexico, Colombia, Brazil, Zaire, Indonesia, and Australia, contain 50-60 percent of all known species (5). Habitat loss through clearing of tropical moist forests is considered to be a main threat to biodiversity conservation (9). Deforestation due to expanded tavy production

is considered to be a primary cause of habitat loss in Madagascar. In the past, this loss has not been explicitly considered as a cost of tavy expansion.

Several arguments can be made for conserving habitat to maintain a stock of biological diversity. The implicit approach followed in the Madagascar NEAP is that preservation of habitat is a valid social objective, without the need for a justification of economic benefits. The choice of this goal is much like the choice of an environmental standard, such as water or air quality standards (so many parts-per-million of a pollutant is considered safe). The standard is determined outside of any cost-benefit calculation, and economic analysis can be used to devise a strategy to attain the standard in a least-cost fashion.

The overall strategy in the NEAP follows several paths intended to be mutually reinforcing. These paths include support and financing for the following areas: (1) basic government institutional capacity and development activities, including monitoring and evaluation, data development, and policy analysis capabilities; (2) policy changes; (3) protected area management for biodiversity; and (4) local projects to support sustainable development techniques as substitutes for existing practices. These projects will focus on the development of protected areas in periphery zones to reduce demands for land extensification.

Within these generic strategies, the EP-I, designed to support implementation of the NEAP strategy, is focusing on a select set of priorities. According to the World Bank, the EP-I focuses on seven main issues: biodiversity preservation in identified protected areas and development in periphery zones; soil degradation; mapping and geographic information; land titling; environmental training and education; environmental research; and support activities for environmental policy and management (10). USAID provides funding in the areas of biodiversity, soil degradation, research, and policy support activities.

The economic analysis in the NEAP does not identify the key factors driving environmental problems that are amenable to change through NEAP activities. Thus, for example, there are no details on how local projects will change existing incentives. This is not necessarily a criticism of the NEAP development, because these key factors could be very site specific and change in important ways over time. As a result, the NEAP cannot be expected to provide a detailed analysis of the causes behind and strategies needed to change these key factors. Instead, the NEAP and supporting activities investigate local level policy changes that will encourage agricultural intensification, reduce deforestation, and develop periphery zone activities.

Conclusion

The most difficult tasks for Sub-Saharan African environmental policy and project interventions will be to identify the key underlying factors causing environmental problems and determining which of these factors can be feasibly changed. Data availability is always problematic and important gaps exist regarding even basic variables and trends. However, it

is clear that environmental problems are driven by land use decisions of large numbers of geographically dispersed rural and urban inhabitants. Their decisions are driven by a lack of agricultural development, stagnant urban economies, population growth, and political uncertainties.

These basic development problems are not easy or even feasible targets for specific "environmental" policy changes. If this is the case, as it seems to be in Madagascar, then it is unrealistic to hope that national environmental policies can provide a framework for understanding and alleviating a country's environmental problems. An integrated policy approach, factoring in economic development issues, population control, and political realities, has the most potential for addressing the causes of environmental degradation.

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Food Consumption, Nutrition, and Consumer Policies

While the proportion of Sub-Saharan Africa's population that is chronically undernourished has remained virtually unchanged since the 1970's, the absolute number has increased dramatically due to the region's high population growth rate. Dietary supplies are grossly insufficient at 2,100 calories per person per day, or 90 percent of the minimum requirement. The region's consumption patterns are driven by population growth, income growth and distribution, commodity prices, urbanization, and government policies.
[Margaret Missiaen and Shahla Shapouri]

Nutritional Situation

World food production is growing faster than population, and supplies are adequate to meet the energy requirements of the earth's people if distributed evenly. Dietary energy supplies in developing countries as a whole continued to increase in the 1980's although at a slower rate than in the previous decade. This led to a steady decline in the proportion and the absolute number of chronically undernourished people.

However, this improvement was not spread evenly across all developing regions.

In Sub-Saharan Africa, the proportion of the population that is chronically undernourished has remained practically unchanged since the 1970's, but due to the high population growth rate (3 percent per year) the number of people affected has increased dramatically from 130 million to 180 million (9). By the end of the 1980's, the 500 million people in

high-income developed countries had more than 3,000 calories available per person per day, while Sub-Saharan Africa with a similar population had grossly insufficient dietary supplies at 2,100 calories per person per day--90 percent of the minimum requirement (2),(8). At least 10 countries in the region were consuming below 2,000 calories per day. The accompanying population article discusses the effect of poor nutrition on health and subsequently on labor productivity.

Sub-Saharan Africa's nutritional problems have received little attention except during severe food shortages and famine. One reason is that transitory food shortages caused by political disturbances and drought tend to capture the world's attention more than chronic problems. In addition, most government statistics are based on urban areas that have benefited from consumption subsidies and have better access to health care services and sanitation facilities.

Factors Affecting Nutritional Status

In general, poverty is the root cause of poor nutrition. Acute and chronic undernutrition primarily affect the poor who cannot afford adequate food and live in environments without access to clean water and basic services. Sub-Saharan Africa's income is the lowest in the world. In 1992, the region's average per capita income was \$350, or about 1.7 percent of that in North America (about \$20,000) (13).

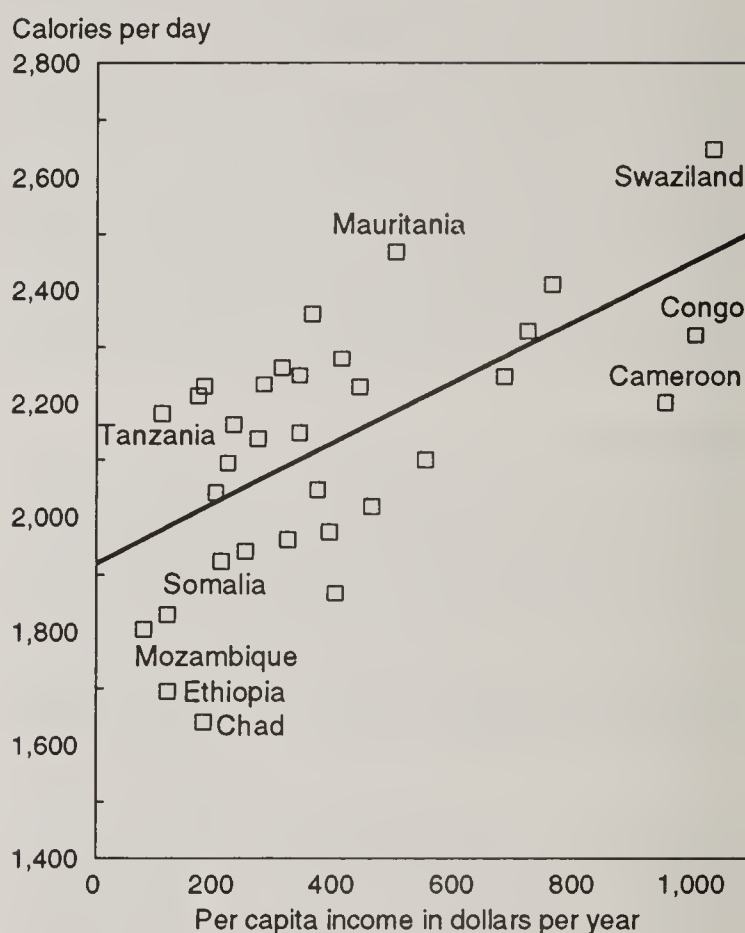
Undernutrition is one dimension of the widespread poverty in the region (fig. 23). Health indicators also show that life expectancy in Sub-Saharan Africa is only 51 years, compared with 62 years for low-income countries and 77 years for high-income countries. The region's infant mortality rate is almost 50 percent higher than that in all low-income countries and at least 10 times higher than that in high-income countries (13).

Poverty-linked undernutrition is prevalent among several identifiable groups. These groups are small or marginally subsistence farmers, nomadic herdsman, and landless rural laborers. For many subsistence farmers and their families, productivity is low and output inadequate to meet minimum nutritional needs in normal years, and drought means severe food shortages and famine unless food relief is provided. The nomads, whose numbers are sizable in countries such as Mali, Niger, Sudan, and Somalia, are poor even by national standards. They are very vulnerable to drought and to degradation of natural resources. In Somalia and Sudan, the famines that plagued the 1980's left many survivors with few assets and an increasingly fragile agricultural income base that offers little protection against future crises. In such circumstances, people are permanently food insecure (see *Household Food Insecurity and Resource Use*).

Seasonal variations in food consumption also seriously affect nutritional levels, particularly in rural areas. At harvest time food is abundant, and most income is earned during this period. Food and income decrease as the next season approaches. Estimates of unmet nutritional needs differ. The Food Aid Needs Assessment done annually by ERS makes two estimates of the food gap based on two targets for per capita consumption. One method calculates the amount of

Figure 23

Sub-Saharan Africa: Income and Nutrition



grain needed to bring consumption up to the FAO minimum nutritional requirement. This approach shows a nutritional gap of 12 million tons of grain in 1993/94, after taking into account production and commercial imports. The other method holds consumption constant at the level of the last 5 years. In this case, more than 5 million tons of grain are needed just to maintain per capita consumption at the low average of the last 5 years. In recent years, imports including commercial purchases and food aid have averaged 11 million tons (table 22).

Factors Affecting Food Consumption

The region's consumption patterns reflect changes in the determinants of demand such as population growth, income growth and distribution, commodity prices, and urbanization. Government policies influence all of these factors.

Population

Sub-Saharan Africa has 530 million people divided among 40 countries. Nigeria's 98 million people make it by far the most populous country. The only other country with more than 50 million inhabitants is Ethiopia. However, population growth rates are high and are not expected to decline significantly in the near future. The African population is young, with about 40 percent of the people under 15 years of age. Few countries have extensive family planning programs, and these programs are not expected to have much impact on food demand in the next decade.

Table 22--Sub-Saharan Africa: Summary of forecast grain food aid needs 1/

	Population	Production	Commercial imports	---Status quo--- Food use	Food aid needs 2/	-Nutrition-based- Food use	Food aid needs 2/
	Million	-----Million tons-----					
Central Africa							
1992/93	54.8	2.0	0.6	2.4	0.4	2.8	0.8
1993/94	56.6	2.3	0.4	2.5	0.1	2.9	0.5
1994/95	58.4	2.3	0.5	2.5	0.2	3.0	0.7
East Africa							
1992/93	177.4	17.4	0.9	18.8	3.5	22.5	7.2
1993/94	183.3	19.0	1.4	19.2	2.1	23.2	6.2
1994/95	189.4	20.4	1.5	19.9	1.8	24.0	6.2
Southern Africa							
1992/93	69.1	4.1	2.2	8.8	4.0	9.4	4.7
1993/94	71.3	8.8	0.9	8.9	1.4	9.7	2.3
1994/95	73.5	8.5	0.9	9.2	1.8	10.0	2.7
West Africa							
1992/93	189.7	20.5	3.1	21.4	1.7	22.5	2.8
1993/94	195.8	20.8	4.2	22.3	1.5	24.2	2.7
1994/95	202.0	21.8	4.3	23.1	1.7	25.0	3.2
Sub-Saharan Africa							
1992/93	491.0	44.0	6.8	51.4	9.6	57.2	15.5
1993/94	507.0	51.0	7.0	53.0	5.1	60.1	11.7
1994/95	523.3	53.1	7.2	54.7	5.5	62.0	12.8

1/ 1992/93 data are forecasts made in 1992 and are not strictly comparable to the 1993/94 and 1994/95 estimates because a change in the commercial import methodology.

2/ Food aid needs estimate includes stock adjustment.

Income

Income growth and distribution also determine patterns of food consumption. Income growth in the region is the lowest in the world and has declined on a per capita basis. This means purchasing power is limited and has declined through time. Per capita incomes range from \$60 in Mozambique to \$4,450 in Gabon (South Africa's per capita income is \$2,670) (13). Income distribution is skewed with the low-income group having a disproportionately small share of the region's total income. In 1992, per capita incomes were less than \$500 in 21 countries.

The weak economic performance of the region, in general, is reflected in the poor performance of the productive sectors. Agricultural output has failed to keep pace with population growth. In Africa's post-independence development strategy, agriculture was viewed as a support sector, providing raw materials and a tax base to generate capital for industrial investment. Included in this strategy was the expansion of the government's role in allocating resources through direct control of trade and prices, and other regulations.

Because of these efforts, the region did not achieve sustainable growth in agriculture and nonagricultural sectors. Initially growth in industry and manufacturing was moderate, 3.6 and 4.3 percent per year during 1970-80. During this period domestic policies to promote industrialization as the engine of growth helped to allocate domestic resources, and these were supported by record commodity prices in the mid-1970's, increased external borrowing, and foreign aid. But with the decline in commodity prices in the late 1970's and the scarcity of external financing, investment declined, resulting in industrial and manufacturing growth of 1.4 percent and 1.2 percent per year between 1980 and 1992.

Income distribution also influences consumption patterns. People in lower income groups spend a larger proportion of their income on food and buy cheaper foods. Therefore, policies that directly or indirectly promote income growth for the top 20 percent of the population or price subsidies (income effect) that support high-priced commodities produce different consumption patterns than policies that target lower income groups.

Income distribution data are limited, as is information on consumption patterns by income group. Yet some generalizations can be made: the top 20 percent of the population in Sub-Saharan Africa has more than 40 percent of the income, while the bottom 20 percent has less than 10 percent. Given the low income of many African countries, the middle 40 percent does not constitute a middle income group as in developed countries. In other words, absolute poverty may extend into the middle 40 percent of the population.

Low and declining incomes and skewed distribution mean that large numbers of people are nutritionally vulnerable. Given the income characteristics, the shift away from direct grain consumption--the trend in wealthier countries--is not imminent in Africa. For, perhaps, the poorest 40 percent of the population, home-produced commodities such as root crops, corn, sorghum, and millet will remain the main food consumed. A recent study shows that under increasingly difficult economic conditions facing African farmers, cassava has become a major source of food for the rapidly growing population (3). In fact, in 65 and 73 percent of the villages studied in Nigeria and Ghana, cassava production has expanded, replacing other crops. Cassava is a nutritionally inferior food because of its low protein, vitamin, and mineral content. This type of diet needs to be supplemented with

grains, vegetables, and livestock products to avoid increased incidence of malnutrition.

Price Policy

In the early 1980's, consumer policies in Sub-Saharan Africa were characterized by heavy intervention and large transfers. In the mid-1980's, as government budget constraints grew in most countries, the level of intervention and support fell (table 23). Such a trend reflects the realization that consumer subsidies depress local agricultural production, divert resources from industrial investment, and stimulate imports. Countries have shown varying degrees of success in pursuing these policies. For example, in the 1980's, the Zambian government repeatedly proposed increases in corn meal prices, but urban consumers protested, and the price rises were rescinded.

Nevertheless, many governments have been forced to remove subsidies because of budgetary considerations. Exchange rate adjustments also have removed indirect consumer subsidies, as official exchange rates have moved closer to equilibrium rates.

Sources of Food Supply

Domestic sources are by far the most important contributor to grain consumption, supplying on average about 80 percent of the total intake (fig. 24). The contribution of domestic production varies annually, reflecting weather variability. As

noted earlier, agricultural output has not kept up with population growth. Most countries in the region lack the financial resources to fill the food gap with imports. As a consequence, consumption has declined.

Imports

Sub-Saharan Africa's grain imports jumped 30 percent from 8.3 million tons in 1980 to 10.9 million tons in 1993. These imports grew at about the same rate as grain consumption, accounting for 17 percent of the total. Production shortfalls caused unusually high imports in 1984-85 and 1992-93. On average wheat accounts for almost half of Sub-Saharan Africa's total grain imports, while coarse grains and rice each contribute about 25 percent.

Sub-Saharan countries rely heavily on imported wheat and rice. More than 70 percent of wheat supplies are imported and the import share of consumption has changed little since 1980. The region produces a larger share of its rice needs, importing less than 40 percent. The region is close to self-sufficient in coarse grains.

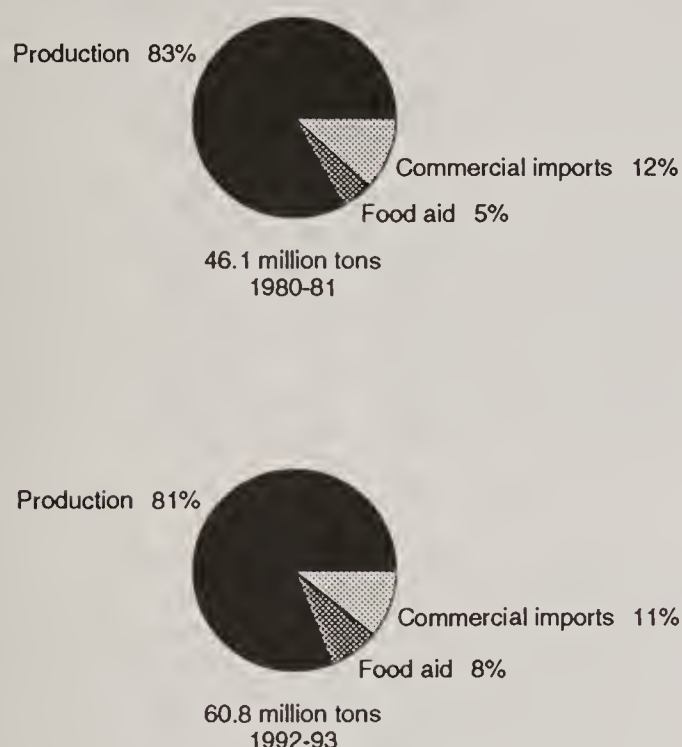
Wheat and rice imports are much less variable than coarse grain imports. With few exceptions, African countries are not major wheat or rice producers, and imports make up a large share of supplies. For coarse grains, the staple foods in most countries, imports vary depending on domestic production. Only 7 percent of corn supplies are imported in normal years.

Table 23--Consumer subsidy equivalents, selected African countries 1/

Country and commodity	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
	Percent										
Kenya:											
Wheat	105	107	73	41	25	-3	53	39	20	21	9
Corn	145	163	102	58	42	42	67	62	16	-2	-32
Rice	84	68	11	-10	-7	10	14	20	-8	-7	-31
Nigeria:											
Wheat	-17	-2	120	92	55	-39	-68	-72	-75	-66	-71
Corn	-78	-58	-43	-40	-46	-22	-51	-22	-36	-42	-51
Sorghum	-70	-78	-33	-44	-33	-31	-54	-29	-24	-49	-40
Rice, milled	-52	-47	-28	-48	-59	-37	-49	-42	-52	-39	-50
Senegal:											
Wheat	-12	-9	7	-13	-29	-23	5	9	-11	0	-1
Millet/sorghum	-40	-22	-23	-43	-64	-71	-63	-57	-63	-60	-63
Rice	-27	-28	-27	-50	-69	-71	-45	-34	-52	-49	-48
Peanut oil	-34	8	9	-19	-69	-64	-25	-2	-21	-43	-34
South Africa:											
Wheat	23	10	35	53	25	-3	41	45	-12	-1	-20
Corn	10	18	12	16	-24	-33	16	0	-6	11	-7
Sugar	-24	-23	-38	-15	-9	-28	-9	13	-5	-25	-32
Tanzania:											
Wheat	119	-0	-55	-66	-68	-49	-33	-48	-56	-64	-59
Corn	211	155	83	-1	-33	46	60	82	99	-10	-21
Rice	1	-35	-58	-69	-56	-20	-8	-2	-12	-25	-36
Cotton	547	398	341	21	19	126	51	37	NA	NA	NA
Zambia:											
Wheat	-33	-12	-21	-34	5	-58	-64	-70	-4	-49	NA
Corn	32	89	77	89	305	485	439	159	174	176	NA
Zimbabwe:											
Wheat	123	106	63	36	44	26	50	74	57	48	-5
Corn	95	170	128	48	24	32	62	44	68	135	60
Sorghum	171	200	138	65	49	34	55	80	64	110	81
Cotton	180	205	173	104	78	194	217	202	100	62	53

1/ Consumer subsidy equivalents measure the effect of government policies, such as price controls, exchange rates, and tariffs, on consumers. The value of government intervention is calculated as a share of the costs to consumers of the commodity.
Sources: (11) and updates calculated by ERS.

Figure 24

Sub-Saharan Africa: Sources of Grain Supplies

Corn is the least drought-tolerant coarse grain and production can plunge when the rains fail. For example, a record 22 percent of corn consumption was imported following the Southern African drought in 1992.

Food Aid

Food aid plays a vital role in meeting the consumption needs of Sub-Saharan Africa, accounting for almost 40 percent of total grain imports during the last 14 years. Shipments declined from 1985 to the end of the decade as production increased in many countries. This trend reversed in the early 1990's, and 1993 grain food aid receipts reached nearly 6 million tons, almost 1 million tons above 1985. The severe and widespread drought in Southern Africa was the impetus for this aid.

The types of grain available from donors also influence food aid shipments. Corn and sorghum produced in the United States for feed are poor substitutes for domestic food grains. In many cases, wheat and rice are given as food aid to compensate for coarse grain shortfalls.

Consumption Patterns

The diets of Sub-Saharan Africa are dominated by grains and roots and tubers. In virtually every country, these items in some combination provide more than 50 percent of daily calorie consumption (6). In the Sahel, diets are heavily grain-based. In the more humid regions of West Africa, roots and tubers are important. Some Central African countries, such as Zaire, have diets heavily based on cassava, particularly in rural areas. Even in countries with heavy concentrations of livestock, such as Somalia and Botswana, the bulk of the diet is still derived from grains and roots and tubers. There are

also clear differences in rural and urban diets. Wheat (primarily imported) and rice have become increasingly important in urban areas, often displacing traditional foods.

Grains are the most traded food items in Sub-Saharan Africa. Total grain consumption (including nonfood use) increased from 47 million tons in 1980 to more than 60 million tons in 1993 (10). However, this annual 2-percent increase was less than the population growth rate. Nonfood uses, including feed, seed, and waste, were about 15 percent of grain availability. Per capita consumption of all major grains declined from 134 kilograms to 122 kilograms between 1980 and 1993. Rice consumption decreased more rapidly than either wheat or corn. Corn is the most important grain in the region's diet, supplying about 35 percent of total grain consumption, followed by rice with 17 percent and wheat with 12 percent. The remainder is mainly sorghum and millet.

Regional Consumption Patterns and Policies**Coastal West Africa**

As in other Sub-Saharan African countries, most foodstuffs in West Africa are consumed on-farm and traded locally. Therefore, consumption reflects regional differences in production patterns. In Benin, Ghana, Cote d'Ivoire, Nigeria, and Togo, coarse grains such as millet and sorghum predominate in northern regions, while corn and root crops are consumed in the south. In other countries, rice is the staple supplemented by cassava.

There are significant differences in urban and rural consumption patterns in the region. Rice and wheat are increasingly substituted for traditional crops in urban areas. This consumption, however, is highly dependent on imports. Nearly 100 percent of the region's wheat consumption was imported in 1993 after Nigeria lifted its import ban and began to rebuild stocks. West Africa imports 40 to 45 percent of its rice. High urban growth rates (5 percent per year in the 1980's) and income growth in the 1970's put major pressure on imports. Since then imports have declined because of financial difficulties and government import restrictions. Because of structural adjustment programs, consumer prices for most foods were liberalized.

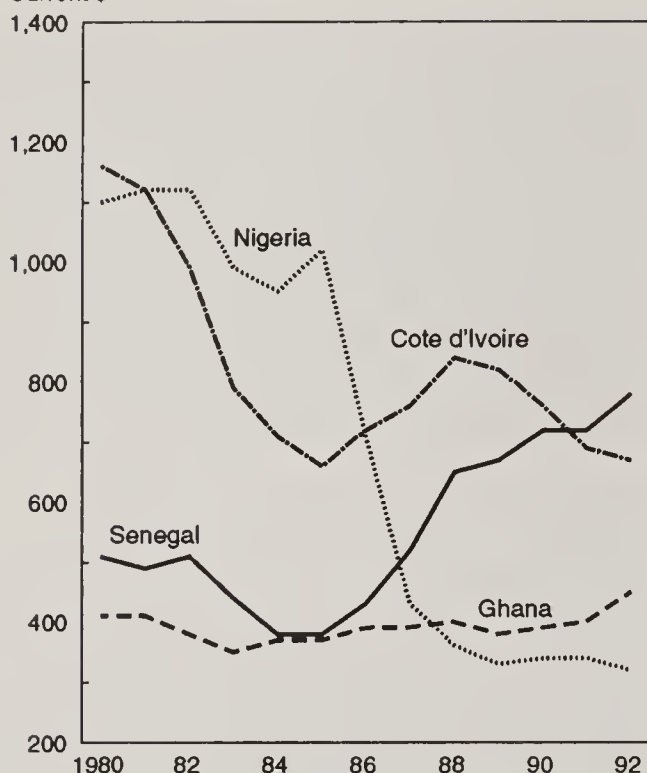
Per capita incomes fell in the 1980's for all of the coastal West African countries (fig. 25). Most of the decline was in the first half of the 1980's and since then there have been signs of recovery in some countries. In Nigeria, for example, per capita income declined sharply in the early 1980's and only after a broad range of policy reforms in 1986 did the economy begin to improve. Real GDP growth averaged 8 percent in 1988-90. In the following years fiscal discipline weakened and oil prices fell, leading to slower economic recovery, 4 percent growth in 1991-92.

Ghana, the success story of the region, has shown steady economic growth since 1983, due to policy adjustments and increased inflow of external assistance. Cote d'Ivoire had the worst economic growth rate in the region. Per capita income fell 4 percent per year in the early 1980's and 7 percent annually in the second half of the decade. In 1991, per capita

Figure 25

West Africa: Per capita GNP

Current \$



GDP was \$690, down from \$1,160 in 1980 (14). Most other coastal West African countries, including Benin, Liberia, Sierra Leone, and Togo, had lower per capita income growth rates in the late 1980's than during the early 1980's. Lower income growth rates imply that the gap between actual consumption and nutritionally adequate consumption will close very slowly.

Reliance on grain imports fell for most West African countries between 1980 and 1993. The only exceptions were Liberia and Sierra Leone, where civil war has sharply reduced production. Dependence on wheat imports is higher in West Africa than in the continent as a whole. The 95 percent of consumption imported since 1980 reflects agro-climatic conditions that are not suited for wheat production. Although some West African countries--Cote d'Ivoire, Guinea, Nigeria, and Sierra Leone--produce rice, the region still imports more than 40 percent of its rice.

West Africa's grain import growth, in particular, was dampened by Nigeria's ban imposed in late 1986. In Nigeria, lower foreign exchange earnings caused by falling petroleum prices encouraged the government to adopt a food self-sufficiency policy. While imports rose in 1993, the country on average relied on imports for only 10 percent of its grain supplies.

In West Africa, the major importing countries are largely commercial grain markets. Food aid dependency in the region has fallen from 23 to 17 percent during the last 10 years. Nigeria does not receive food aid. Food aid provides only 4 percent of total grain imports in Cote d'Ivoire and 15 percent in Senegal (table 24). Ghana, the region's other major grain importer, receives about 40 percent of its imports as food aid. Cape Verde is largely dependent on food aid to meet consumption needs.

Table 24--West Africa grain imports and consumption, 1993/94

Country	Commercial imports	Food aid	Consumption	Per capita Consumption
			1,000 tons	Kilograms
Benin	106	55	798	154
Burkina Faso	80	50	2,625	264
Cape Verde	21	55	82	200
Chad	60	10	841	157
Cote d'Ivoire	655	60	1,779	127
Gambia	62	10	161	173
Ghana	130	100	1,307	78
Guinea	200	36	771	99
Guinea-Bissau	47	28	235	219
Liberia	40	169	329	114
Mali	60	30	2,163	244
Mauritania	140	60	398	187
Niger	70	40	1,960	235
Nigeria	1,150	0	10,260	108
Senegal	635	65	1,549	183
Sierra Leone	68	132	466	103
Togo	89	61	752	183
Total	3,613	961	26,476	135

The Sahel

Millet and sorghum are the basic food grains in the Sahelian countries, (Burkina, Cape Verde, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, and Senegal). These are supplemented by varying amounts of corn, rice, and cassava. Most of these foodstuffs are produced for subsistence and consumed on the farm, while small amounts are traded in the local markets. In this region, grain consumption ranges from 160 kilograms per capita in Chad to 260 kilograms in Burkina (12). These countries are self-sufficient in sorghum/millet in normal years and only rely on imports when their domestic crops fail. In Gambia and Senegal, rice is more important. Most of the consumption in rural areas comes from domestic production, while urban areas are highly dependent on imports. The share of total consumption from imports was 45 percent in Gambia and Senegal in 1993.

Wheat consumption in the region is low--ranging from 4-6 kilograms per capita in Chad, Mali, and Niger to 65 kilograms in Mauritania. There is not much substitution between sorghum/ millet and rice and wheat. Imports of wheat and rice will remain essential, particularly to satisfy urban demand. The growth in imports depends on income growth and government pricing policies.

Per capita incomes in the Sahel vary from \$220 in Chad to \$780 in Senegal (13). Per capita GDP declined during the 1980's for most of these countries. The region's governments have undertaken policy reforms to reduce the public sector role in setting producer and consumer prices. However, government intervention in the agricultural sector was relatively minor. Only a small share of most food crops was actually bought or sold at official prices. An exception would be wheat and rice imports in Senegal which generate significant government revenues.

In Senegal, the government continued to increase wheat flour prices through 1986 despite falling world prices. Wheat flour and bread prices are regulated and act as an urban tax. Since 1986, as a part of market liberalization, retail wheat prices have been lowered. Government intervention in Senegal's rice market is the most important as far as consumers are

concerned. Rice expenditures make up a significant share of family budgets in rural as well as urban areas. Per capita consumption is 90 kilograms in urban areas and 40 kilograms in the countryside. As with wheat in the early 1980's, retail rice prices were increased while world prices were falling. Since 1987 retail prices have declined, and the gap between domestic and world prices narrowed (11).

Retail prices for non-traded commodities such as sorghum are significantly higher in the region than in world markets. In Senegal the border price for sorghum was less than half the domestic price during 1986-89. This gives an impression of a high consumer tax, while in reality imported sorghum is more suitable for feed and is a poor substitute for the domestic product. The governments are encouraging substitution of domestic coarse grains for imported wheat and rice.

Central Africa

Roots and tubers are the major source of calories in Central Africa. Their contribution to the diet ranges from 15 percent in Cameroon to 55 percent in Zaire (6). Per capita food grain consumption is about 50 kilograms, the lowest of all the sub-regions. Central Africa has the highest rate of grain import dependency in Sub-Saharan Africa with imports accounting for 25 percent of total consumption (fig. 26). Both grain consumption and import dependency have changed little over time in this region. In Cameroon the volume of food imports has risen but the value has remained stable, about 10 percent of the total import bill (table 25). Imports of wheat

Table 25--Central Africa grain imports and consumption, 1993/94

Country	Commercial imports	Food aid	Consumption	Per capita Consumption
	1,000 tons			Kilograms
Cameroon	300	3	1,199	92
Central African Republic	60	4	184	59
Zaire	225	25	1,535	38
Total	585	32	2,918	52

and rice have grown because of the high pace of urbanization and reexports to Nigeria. Cameroon is a relatively wealthy petroleum exporter and purchases almost all of its grain commercially.

Income growth in Cameroon changed dramatically in mid-1980's. Unlike the rapid growth in first half of the decade, the second half saw a large drop in terms of trade due to lower petroleum prices, which led to an economic downturn. The adjustment policies adopted by the government in 1988/89 did not bring the economy on track and the decline continued into the 1990's (1). Food prices for main staples such as rice and sugar are set by the government. In practice, the government prices are not enforced, and prices are determined by market forces. In recent years food prices have declined, particularly for imported rice and wheat. This has encouraged a shift in consumption from traditional food crops to imported commodities, particularly in the urban areas.

In Zaire food availability increased during the 1980's, primarily because of domestic production growth. However, most of the production remains in the rural areas, as political turmoil has disrupted the marketing system for the main towns where the food situation is worsening. Zaire's grain imports also have fallen in recent years. Donors have reduced food aid, as the government failed to undertake political and economic reforms.

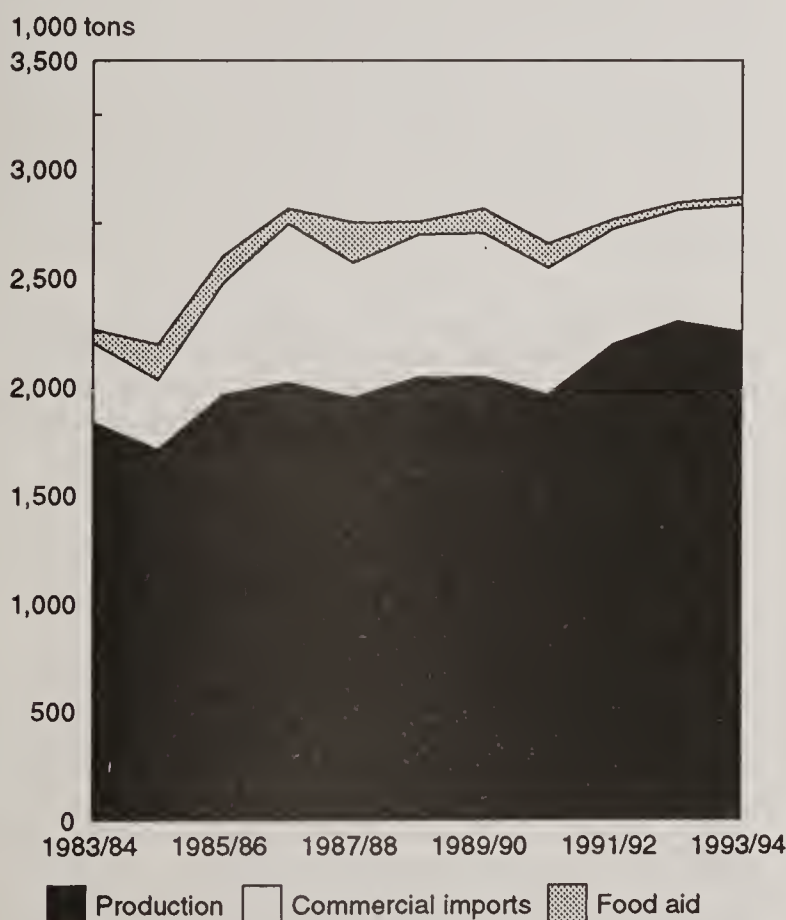
East Africa

A variety of foods are consumed in East Africa and the composition of the diet differs among countries. In most cases, the major sources of calories are cereals and root crops. Kenya's consumption of milk and dairy products is higher than the average for Africa because of a fairly successful dairy sector. Consumption of animal products is higher among pastoralists in some parts of the region, particularly in Somalia, where over two-thirds of the population are pastoralist. Grain is consumed among these groups as a relief measure during drought years.

Corn is an important food in all countries in the region except Sudan. Rice is mainly consumed in the urban areas except in parts of rural Tanzania. Sorghum is the main staple of Somalia and Sudan. Per capita wheat consumption is 10 kilograms in Kenya, 14 kilograms in Sudan, and 20 kilograms in Ethiopia (12). Most wheat is imported and consumed in urban areas, except for Ethiopia, where it is a traditional domestic crop.

Figure 26

Central Africa: Sources of Grain Supplies



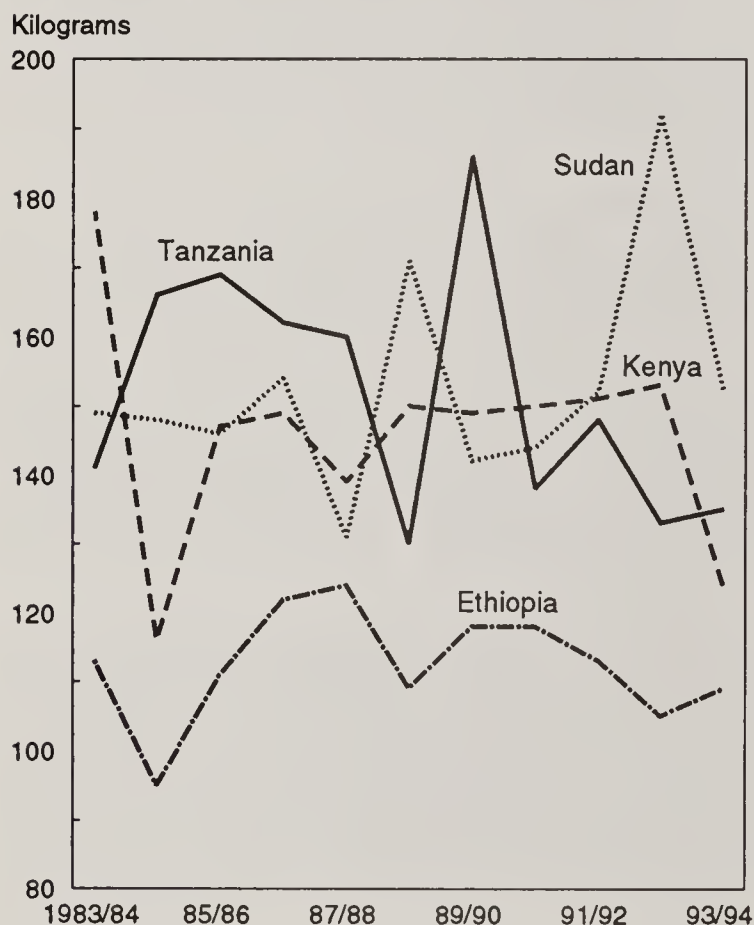
While per capita grain consumption has fallen in East Africa, it varies significantly among countries (fig. 27). At one end of the spectrum is Tanzania, which has shown the most impressive economic recovery since the mid-1980's. At the other end is Sudan, which despite food production recovery, is faced with a total breakdown of its food distribution system and a threat of famine.

In 1986 Tanzania's economic policy shifted from a state monopoly to a free market system. This led to economic recovery with growth measuring 4.5 percent annually during 1985-90, compared with 1 percent in the first half of the 1980's. An important component of the reform program was reduced government control of retail prices. While the government has set prices for major food items since the mid-1970's, it has relaxed controls since 1986. In fact, market liberalization policies have lowered marketing costs and reduced free market prices below the official level in recent years (1). High official prices effectively serve as maximum indicative prices. Wheat, rice, and corn consumers were subsidized in the early 1980's and then taxed in 1991 and 1992. These subsidies were driven by exchange rate overvaluation.

In Kenya, food consumption was supported by high income growth, 5 percent per year, during the second half of the 1980's. This was one of the best performances in Sub-Saharan Africa. In the early 1980's income growth was slow, particularly in 1984, when drought cut agricultural output markedly and hurt the overall economy.

Figure 27

East Africa: Per Capita Grain Consumption



Kenya, despite a relatively strong economy, is faced with high population pressure (3.6 percent growth per year) and growing demand for food and basic social services such as education and health care. To keep food prices affordable for the urban population, historically the government set and adjusted maximum prices for such staples as wheat flour, cornmeal, vegetable oil, tea, and sugar. Retail prices, however, were increased substantially during the late 1980's to reduce or eliminate subsidies. Wheat and corn prices were decontrolled in 1993.

Corn is the staple food in Kenya and contributes almost 50 percent of total calories. In 1982-83, consumer subsidies averaged 141 percent of the combined value of corn, wheat, and rice, but these were reversed to a tax averaging 13 percent in 1991-92 (11). Corn consumers received large subsidies and these outweighed the intermittent taxes imposed on wheat and rice consumers in the 1980's. Corn consumers were taxed in 1991-92.

Civil war and weather conditions dictate economic performance in Somalia and Sudan. In Sudan, the 10-year civil war has diverted funds from agriculture to military use and disrupted marketing activities. In 1991, the government implemented a 3-year economic reform program that has produced some recovery, but many problems remain. Several regions, especially in the south, suffer from undernutrition and starvation stemming from civil war and the breakdown of distribution systems. A UN agreement, instituted in December 1992, allowed for increased accessibility in the south and has facilitated food distribution.

In Somalia, food purchasing power remains low. Somalia is one of the poorest countries in the world with a per capita income of \$120 in 1991. The United Nations' efforts to secure food distribution channels have been relatively successful but intermittent fighting continues to hinder delivery of relief supplies. More than 300,000 people are estimated to have died due to hunger and related diseases since 1992. Undernutrition is prevalent across the country, particularly among children. The situation is not expected to change much in the near future.

East Africa has the lowest import dependency among the regions of Sub-Saharan Africa (table 26). The import share of grain consumption that had declined in the past has risen in recent years and is expected to increase further in 1993/94

Table 26--East Africa grain imports and consumption, 1993/94

Country	Commercial imports	Food aid	Consumption	Per capita Consumption
		1,000 tons		Kilograms
Burundi	11	37	357	57
Ethiopia	350	524	6,094	109
Kenya	550	666	3,356	124
Rwanda	13	90	337	40
Somalia	50	202	579	78
Sudan	150	336	4,436	152
Tanzania	93	25	3,883	135
Uganda	17	62	1,759	87
Total	1,234	1,942	20,801	113

as production shortfalls in Kenya and Eritrea contribute to higher imports. Sudan and Tanzania have become less dependent on imported food supplies.

The region's commercial grain import share has declined during the last decade. East Africa relied on food aid for 70 percent of its grain imports during 1980-1993. In the mid-1980's, more than 80 percent of its imports were food aid. In 5 of the last 11 years, food aid supplied all of Ethiopia's imports. Improved production in Ethiopia and lower food aid shipments to Sudan have reduced food aid dependency. Nevertheless, commercial imports supply only 13 percent of the region's grain consumption.

Southern Africa

Corn is the dominant food of Southern Africa in both urban and rural areas, providing up to 70 percent of total calories. The major variations from this pattern are rural Mozambique, where cassava is the primary food, and Botswana, where sorghum prevails. Rice is also consumed in the region but is of minor importance except in Madagascar, where per capita consumption is over 100 kilograms, among the highest in the world (12).

Consumption of all grains has declined, but corn still provides more than 60 percent of total grain consumption--about 95 kilograms per capita per year. Wheat consumption has declined in the region from 18 kilograms per capita in 1980 to 12 kilograms in 1993 (12).

Stagnant income growth and reduced consumer price subsidies caused the decline in the region's grain intake. Of the eight countries in Southern Africa, only Zimbabwe experienced positive per capita income growth during the 1980's. Malawi's income growth improved somewhat in the late 1980's, because of a broad-based structural adjustment program and favorable weather. However, incomes declined throughout the decade in both Zambia and Mozambique.

Policy reform programs in the region have reduced governments' roles in setting consumer prices. This is especially true in Zambia and Zimbabwe, where food supplies and prices were strictly regulated by marketing boards. In Zimbabwe, the government reduced consumer subsidies in the 1980's and no longer sets consumer prices for wheat and corn. Corn had the highest average subsidy--46 percent of its value--while the wheat subsidy was only 25 percent (11). The subsidy reduction is expected to negatively affect the nutrition of the urban poor. The government is evaluating different policy options such as targeted consumer subsidies to minimize the short-term impacts.

In Zambia, most of the government's efforts since independence were concentrated on keeping prices of staple foods affordable to consumers. Corn consumers were heavily subsidized throughout the decade, while wheat was taxed. This was consistent with the government objective of supporting urban corn consumption and discouraging imported wheat consumption. During 1986-89 retail prices for flour grew nearly 800 percent, compared with a 143-percent increase in the import price (as a result of devaluation). Increases in the

retail corn price lagged the increase in import price. Taxes on wheat consumers and subsidies for corn consumers increased steadily in subsequent years (11).

Domestic sources supply most of the regions' grain consumption in normal years (table 27). Grain import dependency in Southern Africa has varied from 13 to 56 percent since 1980. The drought in 1992 led to unprecedented imports, but improved production in 1993 reduced import dependency. For individual countries, average import reliance ranges from 10 percent for Madagascar and Malawi to 50 percent for Angola, Lesotho, and Mozambique.

Food aid contributes more than half of Southern Africa's total imports due to high food aid dependency in Mozambique and Malawi (fig. 28). Years of unrest in Mozambique caused the country to rely heavily on imports to meet its food requirements. The food aid share of imports has not fallen below 70 percent in the last decade. By contrast, Malawi's imports and reliance on food aid vary from year to year. Food aid supplies on average 10 percent of grain imports, but in some years the country relies on food aid for all of its imports. In other years, the food aid share has fallen below 20 percent. Much of the food aid shipped to Malawi in the late 1980's was fed to Mozambican refugees.

South Africa

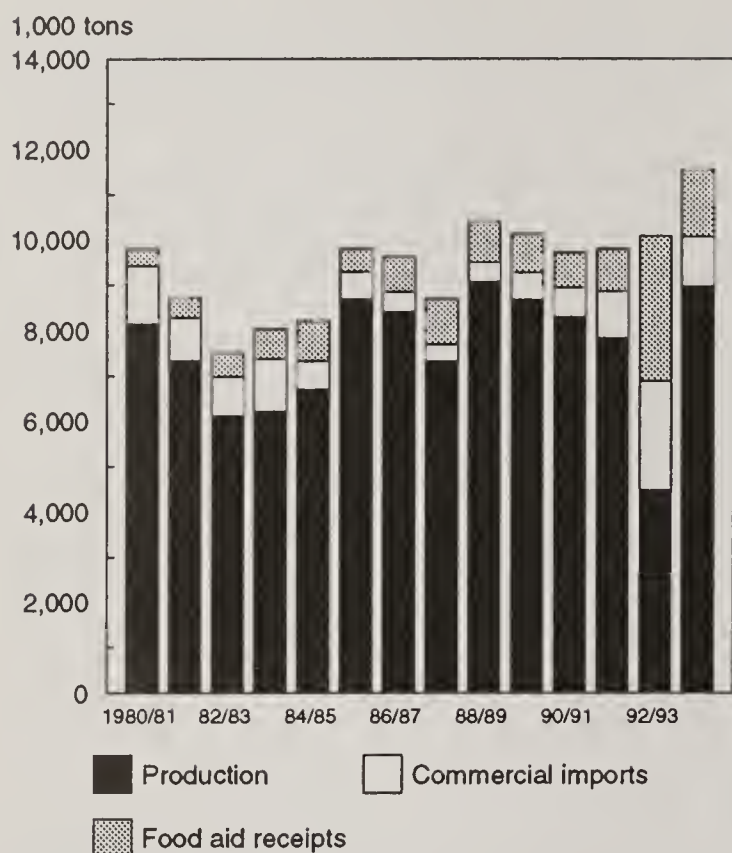
In South Africa as in other parts of Africa, food consumption patterns vary between rural and urban areas with urban diets based on bread, rice, and potatoes, while rural diets are dominated by corn. However, South Africa has an additional dualism in consumption that is not present in other countries--the difference between white, high-income consumers (6 million people) and black (32 million), low-income consumers. Diets of high-income consumers include more livestock products and fresh fruit and vegetables than do those of low-income consumers.

Higher incomes in South Africa have contributed to dietary intake per person of 3,100 calories, compared with 2,100 in the rest of Sub-Saharan Africa. Per capita GNP is over \$2,500, compared with an average of \$350 in other Sub-Saharan countries. However, the nutritional problems of lower income groups (primarily the black population) are similar to the rest

Table 27--Southern Africa grain imports and consumption, 1993/94

Country	1,000 tons		Kilograms	
	Commercial imports	Food aid	Consumption	Per capita consumption
Angola	100	250	667	73
Lesotho	175	50	359	189
Madagascar	142	193	1,896	146
Malawi	75	175	2,231	228
Mozambique	100	650	1,378	86
Swaziland	50	22	202	215
Zambia	20	70	1,803	199
Zimbabwe	425	75	2,755	243
Subtotal	1,087	1,485	11,291	158
South Africa	885	0	11,148	260
Total	1,972	1,485	22,439	209

Figure 28

Southern Africa: Sources of grain supplies

Excludes South Africa.

of the Sub-Saharan countries. According to The Committee for Development of a Food and Nutrition Strategy for South Africa, the undernourished population in 1989 was about 2.5 million with blacks accounting for 87 percent (4).

Lack of purchasing power is responsible for many of the nutritional problems. In 1989, 16.3 million or 63 percent of the population (94 percent of them black) had incomes lower than the minimum subsistence level. Another reason is the government grain price policy of increasing producer prices and taxing consumers (table 27). Food expenditures account for a large share of family budgets of lower income groups, and even in rural areas many farmers are net grain purchasers. Grain contributes 54 percent of the diet on average, and up to 70 percent of the diet of the black population.

Total grain consumption (including nonfood use) in South Africa increased from 9.4 million tons to 11.1 million between 1980 and 1993. Grain consumption grew 1.4 percent a year while South Africa's population grew at a rate of 2.7 percent. This led to a decline in per capita use from more than 300 kilograms to 260 kilos. About 6 million tons are used for food and 4 million tons for animal feed. Industrial use accounts for the remainder. Corn dominates both food and feed use, providing 60 percent of grain used for food and 90 percent of feed grains (12).

Despite a government policy of reducing consumer taxation in recent years, grain consumption continues to decline in South Africa. Poor harvests have caused food prices to rise

faster than prices of other goods for several years, compounding the effects of declining incomes. By the end of 1992, when the current depression appeared to have bottomed out, real GDP had shrunk for 3 years and per capita income was 15 percent lower than in the early 1980's (1).

Almost 90 percent of South Africa's grain supplies comes from domestic sources. The contribution of imported grain varied from 2 percent to 50 percent, reflecting the production variability in South Africa's rainfed agricultural sector. Drought devastated the 1992 grain crop and led to record imports of 5.6 million tons in 1992/93. The last year of large exports was 1989/90, when 4 million tons of corn were shipped.

South Africa produces high quality yellow and white corn for export. However, declining real world prices forced the government to subsidize exports. The export subsidies have been withdrawn in recent years and real producer prices have declined. The current policy is to produce mainly for the domestic market with limited exports to neighboring countries. However, the high production variability makes planning very difficult. For example, the good corn harvests in the last 2 years will force South Africa to export 5-6 million tons in 1994/95.

South Africa relies on imports for its entire rice consumption and to augment its domestic wheat supplies. Until 1988/89, South Africa was largely self-sufficient in wheat, with small quantities imported and exported most years. In 1988/89, a record harvest forced the government to export more than 1 million tons to dispose of the surplus. Since then, incentives to producers have been reduced and imports have exceeded exports.

Food Consumption Outlook

The gap between domestic supply and consumption in Sub-Saharan countries has widened due to slow growth of domestic food production and rapid population growth. The demand for food aid is likely to increase due to lagging purchasing power in countries with inadequate resources.

A simple projection scenario is run to estimate the size of the long-term gap in grains between 1993 and 2005. Most non-grain commodities are not traded and for the sake of simplicity, production of these commodities is assumed to increase with population growth. Food gaps are estimated under two scenarios: 1) maintaining per capita consumption, and 2) satisfying the minimum per capita nutritional requirement.

To project the food gap, population, grain production, and commercial grain imports are increased at the historical rates (3.1, 2.5, and 2.8 percent annual growth). The first scenario projects a food gap of 20 million tons or about 4 times the current level of food aid receipts. This means that without additional food aid, per capita consumption will decline 23 percent from the current level of 123 kilos (the average of the last 5 years). The second scenario projects a larger food gap of 32 million tons by 2005. This is 60 percent higher than the first scenario and 6 times larger than current food aid receipts.

FAO forecasts a slightly positive income growth path for the region (0.1 percent per year until 2010) (5). This projection indicates that while per capita demand may not increase significantly, it may signal the end to the declining trend of the last decade. However, undernutrition in Sub-Saharan Africa is expected to grow and may overtake South Asia in terms of the number of chronically undernourished individuals, even though population will remain only half as large as that of South Asia.

According to World Bank projections, per capita grain consumption for the region (excluding Nigeria) will increase .3 percent per year until the year 2000, and then decline .4 percent in the following decade (2). Africa is expected to face severe food problems in the following decades. With food production growth lagging behind population growth, the food gap and need for food imports will increase.

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Household Food Insecurity and Resource Use

Food insecurity is characterized by a lack of sustainable access to sufficient food. Access to food at the household level derives from a household's ability to produce food and from its legitimate claim on food produced by others. Concerns about food insecurity play an important role in crop choices and resource use by farm households in Sub-Saharan Africa. Recent research indicates a positive relationship between the allocation of resources to cash crop production and food security among some farm households in the region. [Keith D. Wiebe]

Introduction

Poverty alleviation and sustainable resource use are critical issues in development policy today. Food security is central to the relationship between the two. Food security depends in part on how resources have been used in the past, but a more complete understanding of food security also provides insights into how resource allocation decisions are made today.

Hunger and Food Security

Hunger and food security can be understood in terms of four elements--access, sufficiency, sustainability, and security.

Hunger is characterized by an immediate lack of access to sufficient food. Food security requires secure and sustainable access to sufficient food. Food insecurity is characterized by a lack of sustainable access to sufficient food (although the term is often used to refer to hunger).

Access

Access to food at the household level derives both from the household's ability to produce food and from its legitimate claims on food produced by others. These claims--the household's food entitlement--derive in turn from the household's endowment of resources, and are mediated by technology and

by institutions governing property rights and rules of exchange (9). If the household has rights to arable land and water, for example, it can produce food directly. The household may also purchase food using wages or earnings from the production of cash crops or other commodities. If necessary, the household may also draw on reserves of wealth, or it may exercise claims on related households, government agencies, or international organizations.

Sufficiency

A household has access to sufficient food if it can acquire for its members the energy and other nutrients required, in the World Bank's words, "for an active and healthy life" (14). Household access to sufficient food is necessary, but does not guarantee, access to sufficient food by each of the household's members. The nutrient requirements vary with individual characteristics such as age, sex, and health, and with environmental characteristics such as climate and the quality of water, shelter, and health care to which the household has access. Determination of requirements also involves judgments about the range of behavioral and physiological adjustments considered acceptable when food intake varies (2). Finally, requirements are determined with reference to a specific period of time, raising the issue of sustainability.

Sustainability

However requirements are defined, the household may have access to sufficient food for only the current season or year. For example, the household may be forced to deplete or sell its endowment of resources, including its soil fertility or its livestock, to meet its current requirements. In doing so, however, the household compromises its ability to acquire food in subsequent periods. Sustainability involves the ability of the household to generate access to sufficient food while maintaining its endowment of resources over an extended period of time.

Security

However requirements are defined, and over whatever period, the household may have access to sufficient food in some circumstances but not in others. The household's access to food may derive from many sources, each of which is subject to some degree of variation. Direct food production varies with weather and other environmental factors. The real value of off-farm earnings depends on market factors such as wages and food prices. Access to food via cash crop production depends on both environmental and market factors. The household is truly food secure only if, despite such variation, it has sustainable access to sufficient food under all circumstances.

Food Insecurity and Resource Use: The Case of Cash Crop Production in Africa

Concern with food insecurity means that household expectations about future access and requirements influence resource allocation decisions today. At planting time, for example, a food-insecure agricultural household may choose to devote some of its resources to food production to avoid dependence on unreliable markets, even if other activities are normally more profitable.

Recent research questions the conventional wisdom that cash crop production in Africa undermines food security at the household level (12). It reports evidence, for example, that per capita grain availability is "markedly higher for cotton producers than for non-cotton producers" in southern Mali. Another report finds that sugarcane-producing farm households in southwestern Kenya are significantly better off in terms of income and consumption than are farm households that do not produce sugarcane, although the direction of a possible causal link between cash crop production and food security is not clear (5).

Pinstrup-Andersen cautions against attributing welfare differences to cash crop production on the basis of cross-sectional evidence alone, pointing out that such an argument is valid only "if it can be assumed that some factor which is unrelated to nutritional status causes households to switch to cash cropping on a random basis" (7). Otherwise, differences in nutritional status or in other variables of interest may simply reflect differences between households that predate the introduction of cash crop production, or that may have led some households into cash crop production in the first place.

Acknowledging this, Kennedy re-evaluates the earlier study's "new entrants" to cash crop production--those who had only recently planted a cash crop for the first time--after they have completed their first sugarcane harvest (9). Income and consumption are again found to be significantly and positively associated with sugarcane production. On the basis of this longitudinal perspective, Kennedy argues that cash crop production, by increasing smallholder incomes, has significantly increased household food security in the area.

The study still focuses, however, on households that have already chosen to produce cash crops, raising questions about why demonstrated gains associated with cash crop production are not more widely distributed. The answers lie in the household's decision to produce cash crops in the first place. Much existing work on the relationship between cash crop production and household food security assumes that this decision has already been made on the basis of factors unrelated to food security. Von Braun and Kennedy cite, for example, "a change in the farm's incentive structure, which favors increased cash cropping," or government enforcement due to perceived beneficial "fiscal or exchange rate effects" at the national level (1).

When cash crop production is a matter of voluntary choice, however, households cannot ignore its effects on food security. Cash crop production affects both the household's ability to produce food and its claims on food produced by others. Thus it influences both the expected magnitude of the household's entitlement and the probability that its entitlement fails to meet household needs in any particular period.

Both of these factors influence the household's decision to produce cash crops. If cash crop production brings higher earnings on average and greater food security than does the production of food, the household's decision seems clear. Cash crop production would be the superior choice. The same is true (with the opposite result) if cash crop production diminishes both expected earnings and food security. In either

case, however, one would expect households to specialize in production of the superior crop (table 28).

The truth is generally more complicated. One cropping activity may well dominate the other in particular cases. But production patterns observed in Kenya include cash crop producers alongside food producers, suggesting that both activities have advantages for some households (13). Interestingly, no households specialize in cash crops to the exclusion of food production, suggesting that the latter activity offers advantages to all households.

If the activity--or the combination of activities--that offers the highest expected returns is not also that which offers the highest degree of food security, the household faces a tradeoff in balancing the two considerations. In particular, average gains in nominal and real income from cash crop production may mask periodic instances in which earnings from the sale of cash crops fail to provide the household with access to sufficient food. Low cash crop yields may periodically coincide with high food prices, for example. If low yields mean high cash crop prices, cash crop producers may not suffer any decline in their access to food. If cash crop prices are fixed, however, low cash crop yields may not imply high cash crop prices, and may in fact translate into very low access to food when food prices are high (10).

Production of cash crops could thus induce periodic food crises even while offering increases over food production in terms of average earnings. In such a situation, some sacrifice in the expected magnitude of the household's entitlement

could thus avert a larger penalty in the form of distress asset sales.

If each household selects its desired level of cash crop production to provide, if possible, an adequate level of food security, the difference between households that choose to produce cash crops and those that do not may be based largely on considerations of food security (and consequently on wealth) rather than on attitudes towards innovation or other unspecified causes. Crop or market failure on the part of a wealthy household seldom involves becoming destitute; the consequences of such failures for a poor household are likely to be more severe. Only households that can adequately self-insure themselves against the possibility of a food crisis may be able to afford the uncertainties inherent in the allocation of resources to the production of a cash crop. Generalizations about the impact of cash crop production on food security thus require understanding of the household's decision to produce cash crops.

This reasoning suggests that food security may in fact drive cash crop production, rather than--or in addition to--the reverse. The positive association between cash crop production and food security found by Kennedy and Cogill is consistent with this reasoning. Indeed, their work suggests two factors that are central to this counter-argument. First, observed differences in the size of land holdings between farm households that do and do not produce cash crops allow the former to produce sugarcane along with enough food for the household without having to rely on markets for food (5). And second, government support of domestic sugar prices protects returns to that crop even when world prices are low. Sugar

Table 28--Producer prices of food and cash crops compared

Country and commodity	1982	1983	1986	1987	1988	1989	1990	1991	1992
Local currency/ton									
Cote d'Ivoire:									
Rice, paddy	60,000	60,000	80,000	80,000	60,000	60,000	60,000	NA	75,000
Cocoa	300,000	350,000	400,000	400,000	400,000	200,000	200,000	200,000	200,000
Kenya:									
Corn	1,077	1,539	1,980	2,090	2,250	2,450	2,778	3,333	6,667
Sugarcane	1,870	2,497	3,300	3,751	4,048	4,400	4,950	5,720	6,930
Ghana:									
Corn	7,992	38,657	32,989	53,882	68,303	54,353	85,208	98,485	NA
Cocoa	12,000	20,000	85,500	150,000	165,000	174,400	224,000	251,200	258,000
Mali:									
Sorghum	NA	103,100	89,700	71,400	110,300	69,800	90,900	89,000	74,800
Seed cotton	NA	75,000	84,650	84,650	84,650	85,000	85,000	85,000	85,000
Nigeria:									
Rice, paddy	400	400	1,000	1,100	1,200	1,000	2,800	3,200	3,200
Cocoa	1,300	1,400	3,500	7,500	11,000	10,100	8,500	10,158	12,745
Senegal:									
Rice, paddy	51,500	60,000	85,000	85,000	85,000	85,000	85,000	85,000	85,000
Peanuts	60,000	50,000	90,000	90,000	70,000	70,000	70,000	80,000	80,000
Tanzania:									
Corn	1,750	2,200	6,223	8,077	9,000	11,000	13,000	30,000	36,000
Seed cotton	4,480	5,850	16,900	19,450	22,350	28,000	41,000	70,000	94,000
Zimbabwe:									
Corn	120	120	180	180	195	215	225	270	550
Seed cotton	500	500	722	740	800	925	1,170	1,430	2,950

NA: not available.

producers are thus sheltered from the possibility that low prices on the international market translate into diminished access to food at home.

Even when cash crop prices are fixed by the government, real returns from cash crop production are vulnerable to fluctuations in the prices of food commodities. In Kenya, for example, official prices for white corn and other staples are fixed prior to planting (8). Because of financial constraints and bureaucratic complications, however, unofficial prices may still reach levels six to eight times as high in bad years (3).

Given variability in access to food via market exchange, Sen suggests that "trade-independent security" may be an attractive strategy for households that are able to produce food directly (9). In a transitional economy, then, households may seek food security independent of the market by producing their own food in sufficient quantities. Once secure in their access to sufficient food, however, households are free to consider other objectives, such as the maximization of expected earnings, on their remaining land. In an environment of choice, it may thus be differences in constraints--in access to land and other reserves of wealth that enhance food security--rather than differences in objectives, that drive observed variations in household behavior with regard to cash crop production.

Food Insecurity and Asset Transfers

Two distinct results emerge. First, wealthier households may gain directly from poorer households in bad years. In distress situations, the value of accumulated food surpluses held by wealthy households appreciates relative to that of any non-liquid assets held by food-poor households. Alleviation of the latter's food deficits involves transfers of assets from the former. Thus the cushion of wealth on which food-secure households sit allows them not only to survive but to benefit from market and environmental fluctuations. Watts indicates that such a process operates in Nigeria (11).

A second result, less often recognized, poses an additional structural concern in the context of emerging markets. By being able to afford the uncertainties inherent in cash crop production, wealthier households outdo poorer households in terms of generating earnings from agricultural production in average and good years as well. As land markets develop, and land values depend increasingly on the capacity of land to generate returns, wealthier households may outbid poorer households for available land. This result holds independently of differences in the ability to finance such a purchase.

Instead, differences in the willingness to pay for a given plot of land derive from differences in household wealth and differences in the average earnings generated from food and cash crop production. A wealthy, food-secure household may be able to produce a cash crop on any additional land it acquires. It can thereby expect to generate more income from any given plot than could a poorer, less food-secure household that would allocate additional land to food.

Lessons for Policy

A complete understanding of the concept of food security must be based on the elements of access, sufficiency, sustainability, and security. Household food security depends in part on past endowments and resource allocation decisions. Through expectations about future access and food requirements, food security considerations also influence household resource allocation decisions today.

These findings have important implications for economic policy in Sub-Saharan Africa. They demonstrate that agricultural production patterns adopted by households near a subsistence threshold may be strongly influenced by fluctuations in the market for consumption goods such as corn. As long as these fluctuations persist and it remains difficult for households to compensate for them from other sources, differences in cropping and productivity patterns will endure, and perhaps even grow.

In an environment of poverty, uncertainty, and institutional change, the development and maintenance of institutions to buffer poor households from the consequences of poor harvests or high food prices are critical. These institutions may take the form of more efficient private markets or more effective public support, or both. The institutions are necessary not only to the support of poor households in the short run, but also to their ability to take advantage of profitable new technologies and activities that will allow them to grow out of poverty in an environmentally sustainable fashion over the longer run.

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Population and the Agricultural Sector

Sub-Saharan Africa's population doubled between 1960 and 1990. During the last decade, population growth has averaged 3.2 percent per year. Declining mortality and high fertility rates have been largely responsible for the increase. This rapid population growth requires high agricultural and income growth to maintain food security. [Shahla Shapouri and Linda Scott]

Sub-Saharan Africa has an exceptionally high rate of population growth. Between 1960 and 1990, the region's population more than doubled to an estimated 527 million, with an average annual growth rate of 3.2 percent over the past decade. By comparison, growth rates in other developing nations, including Asia and Latin America, averaged just over 2 percent per year (13). Rapid population growth has important implications for the region's food security in that it challenges the agricultural sector to increase food availability and to generate income for purchasing food.

Population Trends

Declining mortality and high fertility rates, as a result of improved public health services, are largely responsible for rapid population growth in Sub-Saharan Africa (fig. 29). In most developed countries, declining mortality occurred in conjunction with high income growth and improvements in education and health that helped to reduce fertility rates and stem population growth. By contrast, in Sub-Saharan Africa, decreased mortality, particularly decreased infant mortality, has been accompanied by stagnant income growth, poor nu-

trition, and low levels of education. Thus, population growth has remained high.

Although the data for Africa are inconclusive, the experience of other developing regions has shown that high fertility rates are due to a wide range of socio-economic factors (11). These include women's education levels, household income, the availability of birth control, health status, infant and child mortality rates, and in rural areas, the need for large families to provide labor for subsistence agriculture and to insure security in old age. In Sub-Saharan Africa, religious and cultural traditions that encourage large families and discourage family planning also contribute to the persistence of the region's high birth rates (table 29).

With the exception of successful family planning initiatives in Botswana, Kenya, and Zimbabwe, there is no indication of a sustained decline in Sub-Saharan Africa's population growth rate. A limited number of family planning initiatives gained strength during the 1980's as social and economic indicators deteriorated and the rapid spread of the AIDS epidemic put more pressure on the region's already fragile

Crude Birth and Death Rates in Sub-Saharan Africa, the U.S. and EU

The graph displays three data series over time. The y-axis represents the rate per 1,000 people, ranging from 0 to 50. The x-axis shows years from 1965 to 1990. Sub-Saharan Africa (solid line) starts at approximately 47 in 1965 and declines to about 44 by 1990. The U.S. and EU (dashed line) start at approximately 22 in 1965 and decline to about 15 by 1990. The U.S. and EU (dotted line) start at approximately 19 in 1965 and decline to about 12 by 1990.

Year	Sub-Saharan Africa (solid)	U.S. and EU (dashed)	U.S. and EU (dotted)
1965	47	22	19
1970	46	21	17
1975	46	19	15
1980	46	18	14
1985	45	16	13
1990	44	15	12

Population Growth and Agricultural Productivity

By putting pressure on land resources without simultaneous investments in changing technologies, continued rapid population growth will have severe implications for food consumption and the nutritional status of the population. This in turn reduces labor productivity, which is a primary factor behind declining agricultural growth in Sub-Saharan Africa. Thus, declining per capita agricultural output influences fertility rates by reducing farmer incomes, limiting women's educational opportunities, and by influencing decisions about family size.

The impact of population growth on the region's agriculture varies with population densities and the availability of land resources. Nearly 70 percent of Sub-Saharan Africa's inhabitants live on less than a third of the available land area. As a result, population densities in many countries are low and large tracts of potentially cultivable land remain unused (table 30). In these countries, population growth may have a positive impact on agricultural productivity and rural incomes by

Country/ region	GNP per capita average annual growth rate	Female illiteracy	Secondary school enrollment		Share of population under age 15	Total fertility rate		Change in fertility rate
	(1980-92)	(1990)	Female	Total	(1990)	(1970)	(1992)	(1970-92)
			-----Percent-----			Children per woman		Percent
Sub-Saharan Africa average	-0.8	62	18	16	46	6.5	6.1	-6.2
Low-income countries								
Ethiopia	-1.9	--	12	11	47	5.8	7.5	29.3
Ghana	3.1	49	38	29	47	6.7	6.1	-9.0
Kenya	0.2	42	29	25	50	8.0	5.4	-32.5
Lesotho	-0.5	na	25	30	--	5.7	4.8	-15.8
Madagascar	-2.4	27	19	18	46	6.6	6.1	-7.6
Malawi	-0.1	--	4	3	47	7.8	6.7	-14.1
Mozambique	-3.6	79	8	5	44	6.7	6.5	-3.0
Nigeria	-0.4	61	20	17	47	6.9	5.9	-14.5
Somalia	-1.9	86	---	---	46	6.7	6.8	1.5
Tanzania	0	--	5	4	47	6.4	6.3	-1.6
Uganda	--	65	13	35	49	7.1	7.1	0.0
Zimbabwe	-0.9	40	52	45	45	7.7	4.6	-40.3
Middle-income countries								
Cameroon	-1.5	75	28	23	46	5.8	5.8	0.0
Cote d'Ivoire	-4.7	60	24	16	47	7.4	6.6	-10.8
Senegal	0.1	75	16	11	47	6.5	5.9	-9.2
Other world regions								
Low income	3.9	52	41	35	--	6.0	3.6	-40.0
Low and middle income	0.9	46	45	39	--	5.6	3.4	-39.3
South Asia	3	69	39	29	--	6.0	4.0	-33.3
Latin America/Caribbean	-0.2	18	47	54	36	5.2	3.1	-40.4
Middle East/North Africa	-2.3	57	56	51	41	6.8	6.8	0.0
Europe/Central Asia	--	24	72	68	--	2.5	2.2	-12.0
World	1.2	45	52	49	32	4.9	3.2	-34.7

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Table 30--Population indicators for Sub-Saharan Africa, 1991

Country/ population density level	Population per square kilometer	Population	Annual average population growth	Agricultural population
	Number of persons	Millions	-----Percent-----	
1,000 +				
Mauritius	5,309	1.1	0.9	22.4
Rwanda	3,000	7.9	3.9	86.3
Burundi	2,096	5.8	3.3	88.0
500-1,000				
Nigeria	967	89.3	3.2	80.9
Malawi	797	9.4	2.6	71.3
Uganda	792	18.7	3.7	83.8
Gambia	774	0.9	3.2	81.6
Togo	672	3.8	3.8	66.1
Ghana	657	15.7	3.2	49.1
Sierra Leone	614	4.4	4.1	59.5
Lesotho	594	1.8	2.7	79.9
Swaziland	511	0.9	3.9	60.3
300-500				
Kenya	435	25.2	3.7	75.6
Ethiopia	430	52.6	3.2	71.3
Benin	429	4.8	3.4	59.7
Senegal	404	8.0	3.1	74.1
Cote d'Ivoire	403	13.0	4.0	52.5
Burkina Faso	341	9.4	3.1	83.2
South Africa	333	40.6	2.7	13.2
Guinea	315	7.8	4.7	56.3
100-300				
Tanzania	284	26.9	3.5	83.1
Guinea-Bissau	283	1.0	2.4	75.3
Zimbabwe	274	10.7	3.1	63.2
Cameroon	258	12.3	3.3	60.1
Madagascar	208	12.2	3.3	77.3
Mozambique	186	14.9	3.1	87.6
Zaire	161	37.8	3.3	63.3
Zambia	112	8.4	3.6	71.2
Somalia	111	7.1	1.9	76.3
Sudan	109	27.4	3.2	55.8
Less than 100				
Angola	70	8.7	2.6	82.4
Botswana	22	1.3	2.8	66.9
Mali	68	8.4	2.4	90.6
Congo	67	2.3	2.9	60.1
Niger	61	7.8	3.5	89.1
Central African Republic	47	3.0	2.6	65.2
Gabon	41	1.1	1.1	74.3
Chad	40	5.1	2.1	83.5
Mauritania	19	2.0	3.2	66.7
Namibia	18	1.5	4.7	41.4

Source: (10).

stimulating food demand and encouraging technological innovation. Steady growth in the labor force and increased expenditures on education and market infrastructure could also improve agricultural productivity in these countries.

However, financial and policy constraints have limited the ability of most countries to generate sufficient private and/or public sector investment to sustain such development. The neglect of the agricultural sector has been particularly evident in the rural market infrastructure necessary for agricultural commercialization. As a result, these countries have remained dependent on primitive systems of food supply. Without improved technologies and a transportation network for marketing food production, local producers are unable to compete with low-priced food imports. This has increased import dependency in urban areas, and reduced food security among rural households.

Alternatively, in many other countries, population densities are high and population growth is quickly outstripping the availability and development of land resources. In these areas, land fragmentation, low rates of input use and technology adoption, poorly developed rural infrastructure, and insecure land tenure have negatively affected agricultural productivity as the sector attempts to maintain per capita output under increased resource constraints (see *Land Tenure in Sub-Saharan Africa*). This has resulted in environmental degradation, soil mining, and stagnant crop yields as marginal lands are brought into production, and fallow periods are reduced or eliminated without the benefit of increased fertilizer use (see *Fertilizer Consumption Remains Low* and *Environmental Problems and Resource Constraints*).

Technological development

The experience of developed regions has shown that population growth, when accompanied by appropriate and adequate

investments in agricultural technology and government policy incentives, can have a positive impact on agricultural development. In developed regions of the world, population growth increased food demand and led to the development and use of new technologies. In these areas, deceleration in population growth occurred in several stages and resulted from a combination of increased agricultural production, urbanization, and industrialization.

In the first stage, income and population growth led to increased demand for food, which stimulated production and the use of new technologies. This was followed by a decline in the percentage of incomes spent on food and a slowed increase in food demand. If it had not been for government intervention in support of agricultural producers, this later stage could have led to a decline in output. However, the governments of Europe, Canada, and the United States developed comprehensive agricultural protection and subsidy systems that continued to encourage development of new technologies and increased surplus production.

In many Sub-Saharan African countries, however, the modernization of the agricultural sector never occurred, despite substantial government intervention. Because population growth has been so much more rapid in Sub-Saharan Africa than it was when the developed countries were transforming their agricultural sectors, it is much more difficult for technology adoption to keep pace with the region's expanding food needs (1). As a result, governments have relied on food imports to alleviate short-term interruptions in domestic food supplies and have channeled their investment resources into

urban development. Subsequently, income differentials between urban and rural areas have continued to widen and food import dependency has increased. Between 1970 and 1991, the region's cereal imports grew more than 60 percent while per capita food output declined 20 percent (8,9).

Population, nutritional status, and health

Where incomes are low and food production is just keeping pace with population growth, poor people are not able to buy the food they need. They suffer from conditions associated with poverty, including reduced food consumption and hunger (table 31). These situations are exacerbated by random occasional shocks to the agricultural system caused by drought, war, or disease.

In many Sub-Saharan African countries, per capita food consumption, an important indicator of overall well-being and poverty levels, is still well below acceptable minimum standards (see *Food Consumption, Nutrition, and Consumer Policies*). The resulting hunger and malnutrition have enormous consequences for agricultural productivity. Malnourished populations have more frequent illness and suffer the obvious medical impacts of ill-health. Malnourished people either work less, are less productive when they do work, or may cope by working less at home to maintain their productivity in off-the-farm jobs (7).

While it is possible to quantify the first two effects, the latter is a coping process that reduces the measurable impact of illness, and serves to hide the true economic costs of ill-health. The substitution of labor that occurs when one member of a

Table 31--Health and nutrition indicators in selected Sub-Saharan countries and world regions, 1990

Country/ region	Life expectancy at birth	Under 5 mortality rate		Infant mortality rate		Daily calorie intake per capita	Under 5 malnutrition rate	Population per physician
		Female	Male	1970	1992			
	Years	-----Per 1,000-----		-----		Calories	Per 1,000	Number
Sub-Saharan Africa	52	155	173	138	96	2,209	---	19,960
Low-income countries								
Ethiopia	49	194	216	158	122	1,635	38.1	32,500
Ghana	56	120	138	111	81	1,951	27.1	22,970
Kenya	59	95	110	102	66	2,020	18.0	10,150
Lesotho	60	61	73	134	46	2,121	13.3	---
Madagascar	51	141	160	181	93	2,195	32.8	8,120
Malawi	44	215	238	193	134	1,942	23.9	45,740
Mozambique	44	269	283	156	162	1,948	---	---
Nigeria	52	174	192	139	84	2,690	35.7	---
Somalia	49	186	205	158	132	1,972	---	---
Tanzania	51	139	158	132	92	2,293	25.2	24,970
Uganda	43	194	216	109	122	2,307	23.3	---
Zimbabwe	60	53	66	96	47	2,098	10.0	7,110
Middle-income countries								
Cameroon	56	109	124	126	61	2,194	13.6	12,190
Cote d'Ivoire	56	121	138	135	68	2,316	12.4	---
Senegal	49	98	113	135	68	2,210	17.5	17,650
Other world regions								
Low and middle income	64	74	82	109	64	--	---	4,810
Low income	62	87	95	102	56	--	---	6,510
South Asia	60	114	112	138	83	2,259	---	2,930
Latin America/Caribbean	68	50	59	82	43	2,610	---	1,120
Middle East/North Africa	64	71	83	134	57	2,928	---	2,240
Europe/Central Asia 1/	70	27	34	138	83	3,479	---	410
World	66	64	71	85	48	2,706	---	3,850

Sources: (10, 12, 13).

1/ Per capita calorie data are for the European Community only.

household falls ill often compensates for lost income, if only partially. For example, in Sudan, where 250 households lost an average of 40 hours per year due to malaria, the labor of women and children substituted for 68 percent of the lost agricultural labor (6). But again, such substitutions are often at the expense of other valuable activities, and do not completely compensate for the loss of the ill family member.

There is also evidence that cropping patterns change to reflect the availability and strength of agricultural labor. For example, a loss in a household's productivity from malnutrition or other ill-health can cause a switch from the production of cash commodities such as coffee, cotton, and cocoa, to more traditional, labor-saving crops. Such a shift can result in lost income, reduced purchasing power, and decreased household food security. Among subsistence households, the shift from production of labor-intensive and nutritious food grains such as corn, to low input, but less nutritious, root crops such as cassava, has a direct and negative impact on household nutritional status. Even without a change in cropping patterns, reduced crop and livestock yields, resulting from decreased labor productivity, have a similar impact on food security.

Population growth affects agricultural productivity through its impact on women's health. Women provide a large portion of the agricultural labor and child care within rural households, and are the primary producers on many farms in Sub-Saharan Africa. If women's health is compromised by malnutrition, frequent pregnancies, or other causes, there is a further decline in women's already low levels of labor productivity. This has significant implications for nutrition and poverty through negative agricultural supply shocks. It also has a negative affect on the health and nutritional status of other household members, since women are usually the family's primary food providers. Furthermore, illness in another family member requires women to care for that member at the expense of performing other caretaking tasks in the household.

Subsequently, ill-health can affect not only the current household income, but may hamper the future income earning potential and fertility rates of the next generation as well. Children's educational opportunities, both at home and at school, are often sacrificed when adult ill-health causes financial hardship. These costs are just beginning to be widely acknowledged (7).

The Impact of AIDS

There are an estimated 8.5 million HIV carriers in Sub-Saharan Africa with over 90 percent concentrated in a 10-country "AIDS belt" stretching from the Congo and Zaire to Kenya and Tanzania (fig. 30). The demand for health care in AIDS-stricken countries is increasing rapidly, and a growing percentage of needed care is unmet due to the magnitude of the epidemic and the prohibitive costs of AIDS treatment. For example, in Kenya a 60-day stay in a hospital costs about \$938, or three times the GNP per capita (2).

In addition to the enormous health care expenditures associated with the disease, the estimated loss of human capital and economic development potential due to AIDS is staggering.

Figure 30

Africa's "AIDS Belt"



Burundi	Kenya	Rwanda	Uganda	Zaire
Congo	Malawi	Tanzania	Zambia	Zimbabwe

The impact is magnified because the population's most productive age group, 15-45, is dying at the fastest rate from the disease. So far, the number of infected persons is higher in urban centers than in rural areas. Such a change in the urban labor force has alarming implications for agricultural productivity as it is reducing the number of technical experts available to modernize the sector. Furthermore, the higher infection rate in urban areas means a diversion of public funds from rural areas and agriculture to care for AIDS-related problems in the cities.

The high incidence of AIDS in Sub-Saharan Africa is also affecting the consumption and production of agricultural commodities. Indirectly, a dramatic decline in the functional capacity of urban areas will reduce the demand for agricultural products. This, in turn, will reduce agricultural production incentives. The World Health Organization estimates that local crop losses from AIDS at the household or village level range from 10 to 50 percent in about 10 Sub-Saharan countries (2).

At the household level, the death from AIDS of a family's primary income earner compromises the health and nutritional status of the surviving household members. Adult ill-health is also likely to increase the desired family size because the ability to share work increases the productivity and income of the family when illness occurs. There will also be increases in school drop-out rates as older siblings leave to care for younger siblings in place of a mother or father. This is a particularly troublesome outcome of AIDS, as in the last 20

years primary school enrollment in Sub-Saharan Africa has increased 60 percent. Higher education levels, especially for women, are also positively correlated with health status and declining rates of population growth.

All of these factors have long-term implications for agricultural and economic development. Because income growth is stagnant across the region, any increase in government expenditures on AIDS comes at the expense of investment in economic development. Infrastructure improvement, new technology adoption, and deficit reduction efforts could be sacrificed or postponed, leading to further declines in agricultural productivity.

Outlook

There is little doubt that prolonged rapid population growth, without subsequent increases in agricultural investment and sustainable cultivation methods, is a frightening prospect for most countries in Sub-Saharan Africa. The decision to reduce family size, however, will not happen automatically. A large number of factors such as agrarian structure, lack of food security, stagnant rural incomes and religious and cultural beliefs are believed to be important determinants of a family's demand for children in the region.

In Sub-Saharan countries, where long fallow and/or tribal tenure systems are common, there is a strong incentive for large families because the ability to increase cultivated area is positively correlated with family size. Family size is made even more important by the fact that most of the food production work is done by women and children. In this system a man can significantly increase his income by having several wives and many children. He also depends on a large family for old age security, since he cannot mortgage or sell land to which he has only user rights. Until the time that an additional child is more expensive than the income and labor that it contributes, households will have few incentives to restrict family size.

Therefore, to reduce population growth, governments should support increased agricultural productivity with investments in market infrastructure and other incentives such as price policies (14). If the adoption of new agricultural technologies is not supported, labor will remain the main input in production and large families will be the main hope for survival. This will be followed by slow or no growth in per capita food supplies, stagnant or deteriorating caloric intake, and declining nutritional status.

In many parts of Sub-Saharan Africa, population pressure has forced people in traditional agriculture to work harder without being able to maintain their incomes or their standard of living, measured in terms of food consumption and production. Ill-health caused by malnutrition, unexpected illness, disease, and accidents, hinder a country's development potential and traps it in a vicious cycle of high population growth, falling per capita food production, and insufficient health care.

Failure by policymakers to recognize the root causes of and linkages between population growth and agricultural performance, leads to growth in basic services in a small number of

urban areas with little impact on the majority of the population living in rural communities. Under such circumstances, overall economic growth rates will be much lower and less sustained than expected. Investment and adaption of improved agricultural technology raises agricultural productivity with a positive effect on rural incomes and health status. This will have a direct and positive impact on population growth rates in these countries.

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Appendix 1--Sub-Saharan African indicators

Region and country	Popu- lation 1992	Popu- lation 1983-92	Per capita GNP 1992	Macroeconomic indicators					Grain production				Coefficient of variation
				Per capita GNP 1980-92	Per food prod. growth 1979-92	Export growth 1980-92	Import growth 1980-92	Debt service ratio 1992	PPP per capita GNP 1992 1/	Average production 1991-93	Production growth 1983-93	Per capita growth 1983-93	
	1,000	Percent	U.S. \$			Percent			U.S. = 100	1,000 tons		Percent	
Sub-Saharan Africa	500,579	3.1	350	-0.8	--	2.4	-2.7	20.0	--	49,779	2.8	-0.3	6.3
Central Africa													
Cameroon	12,658	3.7	820	-1.5	-1.7	10.4	-1.6	16.2	9.9	890	1.5	-2.2	12.7
CAR	3,029	2.8	410	-1.5	-1.1	5.1	3.9	9.6	4.5	123	3.5	0.8	28.3
Zaire	39,084	3.8	--	-1.8	--	--	--	--	--	1,235	3.6	-0.1	6.4
West Africa													
Benin	4,998	3.7	410	-0.7	1.8	10.5	-2.4	4.1	6.5	589	3.0	-0.7	12.4
Burkina Faso	9,654	3.3	300	1.0	2.8	7.7	1.3	6.2	3.2	2,476	6.6	3.3	16.3
Cape Verde	398	3.1	850	3.0	--	--	--	--	--	8	17.9	14.8	90.9
Chad	5,239	2.3	220	3.4	0.3	9.5	9.2	5.4	3.1	769	6.9	4.7	28.5
Cote d'Ivoire	13,497	4.5	670	-4.7	0.1	7.6	1.1	31.9	7.1	1,061	3.0	-1.5	7.4
Gambia	902	3.4	370	-0.4	--	--	--	--	--	105	5.1	1.8	20.7
Ghana	16,185	3.8	450	-0.1	0.3	8.0	1.8	26.7	8.2	1,139	6.1	2.2	25.6
Guinea	7,784	3.8	510	--	-0.5	--	--	12.4	--	550	3.8	-0.0	9.8
Guinea-Bissau	1,047	2.7	220	1.6	1.1	-8.4	-0.2	92.7	3.0	164	6.7	4.0	22.5
Liberia	2,462	0.9	--	--	--	--	--	--	--	120	-4.3	-5.2	13.6
Mali	8,641	2.6	310	-2.7	-0.9	6.5	3.7	7.4	2.2	2,214	4.7	2.1	16.3
Mauritania	2,059	3.4	530	-0.8	-1.5	5.4	5.2	17.2	6.0	132	18.6	15.2	40.3
Niger	8,053	3.4	280	-4.3	-2.0	-4.3	-5.9	14.2	3.2	2,209	3.2	-0.2	18.8
Nigeria	92,134	3.3	320	-0.4	2.0	1.7	-10.5	28.9	6.2	8,697	0.6	-2.8	11.5
Senegal	8,205	3.5	780	0.1	-0.2	2.5	1.9	13.8	7.6	848	4.0	0.6	22.0
Sierra Leone	4,457	3.1	160	-1.4	-1.2	0.7	-8.0	20.5	3.3	267	-2.8	-5.9	10.7
Togo	3,959	4.1	390	-1.8	-0.7	2.9	0.3	7.3	4.8	509	4.3	0.2	18.5
East Africa													
Burundi	6,022	3.6	210	1.3	0.0	8.8	0.1	35.3	3.2	335	0.5	-3.1	11.1
Ethiopia	54,270	3.5	110	-1.9	-1.3	-4.3	-1.4	14.2	1.5	5,067	3.2	-0.3	12.1
Kenya	26,164	4.3	310	0.2	0.1	4.1	-1.0	27.1	5.9	2,802	2.7	-1.5	14.6
Rwanda	8,206	4.2	250	-0.6	-2.2	--	--	23.4	3.3	251	-1.8	-5.9	12.3
Somalia	7,235	2.2	--	-1.9	-6.0	-8.4	-7.0	--	--	272	-4.7	-6.9	39.3
Sudan	28,305	3.3	--	-1.8	-2.2	0.2	-4.8	5.4	--	4,694	10.7	7.4	31.5
Tanzania	27,972	3.1	110	0.0	-1.2	-1.2	-1.3	31.5	2.7	3,567	2.5	-0.6	15.0
Uganda	19,386	4.3	170	--	0.1	1.9	-3.2	40.2	4.6	1,592	1.7	-2.6	10.1
Southern Africa													
Angola	8,902	2.6	--	--	--	--	--	--	--	360	-0.4	-3.0	15.9
Lesotho	1,849	3.0	590	-0.5	-2.2	--	--	5.3	7.7	119	0.4	-2.6	28.5
Madagascar	12,596	3.6	230	-2.4	-1.6	-1.6	-1.5	18.6	3.1	1,554	0.3	-3.3	4.1
Malawi	9,605	5.0	210	-0.1	-5.0	5.8	3.6	23.8	3.2	1,462	1.9	-3.1	16.7
Mozambique	15,469	1.9	60	-3.6	-2.1	--	--	8.1	2.5	450	-0.5	-2.5	18.2
Swaziland	913	4.2	1,090	1.6	--	--	--	--	--	113	2.8	-1.4	39.5
Zambia	8,745	4.2	310	-3.3	-0.8	-3.2	-0.7	--	--	1,211	4.2	-0.0	30.3
Zimbabwe	11,033	4.0	570	-0.9	-3.3	-0.8	2.1	32.0	8.5	1,826	-0.1	-4.1	28.3

-- NA

1/ PPP estimates the number of units of a country's currency required to buy same amount of goods and services domestically as one dollar would buy in the United States.

Source: World Bank, World Development Indicators; FAS, PS&D; and ERS calculations.



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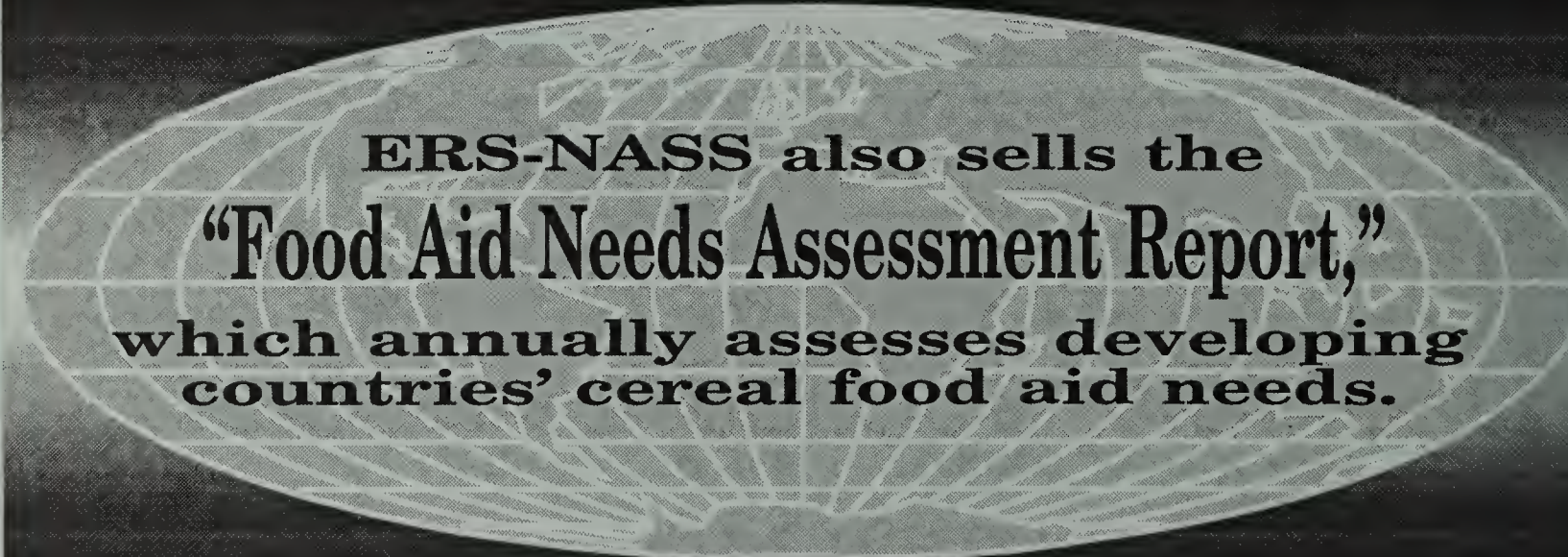
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